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Industrial Surface Coatings - Wood Furniture and Fixtures Emission Inventory Development

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

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INDUSTRIAL SURFACE COATINGS - WOOD FURNITURE AND FIXTURES EMISSION INVENTORY DEVELOPMENT

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Abbreviations and Acronyms

ABL	American Business Lists
AQMD	Air quality management district
ARB	Air Resources Board
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resources Board
CBP	County Business Pattern
CES	Category of emission source
CTG	Control techniques guideline
EPA	Environmental Protection Agency
FAP	Formulation assessment plan
HAP	Hazardous air pollutant
MSDS	Material safety data sheet
NESHAP	National emission standards for hazardous air pollutants
SCAQMD	South Coast Air Quality Management District
SCM	Suggested control measure
SIC	Standard industrial classification (code)
SMAQMD	Sacramento Metropolitan Air Quality Management District
SSD	Stationary Source Division, Air Resources Board
TCA	1,1,1-Trichloroethane
TRG	California Air Pollution Control Officers Association (CAPCOA) Technical Review Group
VHAP	Volatile hazardous air pollutant
VOC	Volatile organic compound

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Executive Summary

Background and Objectives

State and federal clean air legislation require that a comprehensive baseline emission inventory be developed for all sources of air pollution. This study is part of the California Air Resources Board's Emission Inventory Improvement Plan designed to meet these legislative requirements for baseline inventories. The baseline inventories may be used in both modeling and control measure development with regard to both photochemical and toxic air pollutants.

The purpose of this study is to update the methods for estimating emissions from the industrial coatings subcategory of wood furniture and fixtures. The wood furniture and fixture industry encompasses the manufacture of diverse products including cabinets, office furniture, store fixtures, and residential furniture. Specific objectives of this work are to:

1. estimate the amount of coating used in the industrial surface coating of wood furniture and fixtures;
2. develop emission factors for each coating application category;
3. estimate variability for both coating use and emission factors; and
4. specify a source of information and method to revise and update the industrial coating of wood furniture and fixtures emission inventory.

Previous estimates of emissions from the area source component of this category have used emission factors and process rate methods, but have not been updated for several years. Recent changes in federal and air district rules affecting this industry have altered the application and formulation of wood coatings and necessitated development of an updated emission estimation method. Beyond these estimates, this study also has recommendations for the long-term development of emission estimates for this industry.

Approach

The emission estimation method developed and used here is statistical. The approach is based on the idea that furniture manufacturing firms and wood furniture coatings can be divided into small groups of similar firms, and through a survey process, standard profiles of the characteristics of these groups can be developed. Given that valid statistical profiles can be formed, the emission estimate is computed by multiplying three terms: the number of firms in a size and SIC category as measured by the U.S. Department of Commerce; an estimate of coating usage by firms in that category; and estimates of emissions factors for each coating category. This type of estimator has the advantage that it uses a relatively small amount of information and is flexible enough that it can be used to explore how future changes in coating use and formulation rules would affect emissions. Estimates of the number of firms by size category for this industry are produced regularly by the U.S. Department of Commerce, making it easier to update our estimates for changes in general business conditions.

For estimation purposes, the broad range of coatings used in coating wood furniture must be divided into subcategories. In any statistical estimation procedure, dividing a sample into smaller groups can *increase* the accuracy of the estimate by reducing the "averaging" effect of lumping disparate items together. However, too much of this division process can also *decrease* accuracy because it necessarily reduces the number of samples within each subcategory and can thereby increase the statistical variance. Thus subcategories should be chosen to minimize estimation error by balancing the error causing impacts of aggregation and disaggregation of coating categories.

This study has involved three formal survey processes. Formulations of wood furniture and fixture coatings have been evaluated through a survey of coating manufacturers, and furniture manufacturing practice and coating use data have been gathered through two mail surveys of coating applicators. These surveys were complemented by extensive telephone conversations with those in the industry, site visits to industrial facilities, and discussions with local air quality management personnel.

The number of survey responses to all surveys was surprisingly low (11.4% of questioned applicable firms). Applicators that responded to the use surveys indicated that they felt burdened by local regulation and reporting requirements and thus were often unwilling to answer what they saw as another governmental request for data. Manufacturers of furniture generally feel regulation imposes costs on them in terms of both purchase of required coatings and application equipment and in time spent responding to reporting requirements and frequent changes in regulation.

The lower than expected response rate to repeated survey efforts has resulted in emission estimates that are based on limited data and higher than anticipated levels of estimate uncertainty. However, the resulting emission estimates are sufficiently accurate to be useful and reveal interesting emission patterns and trends. These statistical impressions appear to be confirmed by conversations with those in the industry.

Emission Estimates

Estimates of VOC emissions from the industrial coating of wood furniture and fixtures are tabulated in several ways in this report to facilitate different uses of the data. Emission estimates computed from the "bottom-up" approach described above are presented grouped by county, air district, and air basin, as well as by coating category and firm category. These appear in Tables 8-2, 8-3, and 8-5. Statewide, 1993 VOC emissions have an estimated mean of 8,330,000 lbs/year, and a 90% chance of falling between 7,791,000 and 9,907,000 lbs/year.

Additional emission estimates are made using a "top-down" approach based on coating production. These appear, by county and air basin, in Chapter 9. Comparison of the results of the "bottom-up" and "top-down" estimates (Table 9-2) indicate that the bottom-up estimates are reasonable, though about a third smaller statewide. County estimates are re-produced and summarized in Table ES-1. Estimate uncertainty is large, particularly regarding the small number of large firms. Each estimation method has its own biases and it is difficult to conclude which method yields more accurate estimates. However, the independent estimates typically support each other, providing some confidence that actual emissions lie somewhere in the neighborhood of these estimates.

Table ES-1. Summary of VOC emission estimates by county.

County	1983 Top-Down Emissions Estimate (tons/yr.)	1994 Top-Down Emissions Estimate (tons/yr.)	1993 Bottom-Up Emissions Estimate (tons/yr)	- 95% Lower Bound (lbs/yr)	+ 95% Upper Bound (lbs/yr)
Alameda	305.62	332.81	100.60	18.60	33.57
Alpine	0.00	0.00	0.00	0.00	0.00
Amador	3.53	3.84	1.28	0.46	0.49
Butte	8.97	9.77	32.55	7.98	11.18
Calaveras	1.00	1.09	0.00	0.00	0.00
Colusa	0.70	0.76	0.00	0.00	0.00
Contra Costa	97.09	105.73	28.70	4.63	6.65
Del Norte	4.90	5.34	0.41	0.19	0.33
El Dorado	4.25	4.63	6.85	1.65	1.72
Fresno	79.41	86.47	71.67	20.55	33.89
Glenn	3.10	3.38	0.88	0.33	0.39
Humboldt	30.13	32.81	14.45	4.30	8.08
Imperial	6.30	6.86	9.46	7.70	15.37
Inyo	0.00	0.00	0.00	0.00	0.00
Kern	31.98	34.82	10.43	4.15	8.01
Kings	9.80	10.67	9.30	3.31	3.31
Lake	0.00	0.00	1.70	0.51	0.56
Lassen	0.00	0.00	0.29	0.15	0.16
Los Angeles	2873.51	3129.11	1640.56	226.33	588.60
Madera	8.10	8.82	1.39	0.49	0.73
Marin	12.29	13.38	7.79	2.12	2.21
Mariposa	0.00	0.00	0.41	0.19	0.33
Mendocino	19.18	20.89	9.74	3.32	3.32
Merced	18.78	20.45	15.63	3.58	3.77
Modoc	0.00	0.00	0.00	0.00	0.00
Mono	0.00	0.00	0.00	0.00	0.00
Monterey	32.65	35.55	13.24	7.79	15.47
Napa	12.29	13.38	12.31	7.73	15.44
Nevada	4.47	4.87	5.57	1.35	1.38
Orange	617.03	671.92	510.82	88.41	361.57
Placer	1.49	8.74	13.08	7.75	15.42
Plumas	0.00	0.00	0.00	0.00	0.00
Riverside	77.42	84.31	150.63	24.10	32.91
Sacramento	61.91	67.42	132.18	30.70	46.03
San Benito	5.60	6.10	0.56	0.20	0.35
San Bernardino	123.24	134.20	301.71	50.72	62.57
San Diego	279.13	303.96	263.54	47.54	65.94
San Francisco	153.65	167.32	86.92	14.51	17.18
San Joaquin	16.62	18.10	80.04	18.94	27.86
San Luis Obispo	9.04	9.84	21.63	8.11	15.93
San Mateo	110.38	120.20	43.19	15.86	31.32
Santa Barbara	50.22	54.69	14.40	4.34	8.08
Santa Clara	662.94	721.91	160.75	30.11	46.48

County	1983 Top-Down Emissions Estimate (tons/yr.)	1994 Top-down Emissions Estimate (tons/yr.)	1993 Bottom-Up Emissions Estimate (tons/yr)	- 95% Lower Bound (lbs/yr)	+ 95% Upper Bound (lbs/yr)
Santa Cruz	32.71	35.62	21.84	7.07	10.01
Shasta	0.00	0.00	12.20	7.73	15.45
Sierra	0.00	0.00	0.00	0.00	0.00
Siskiyou	8.40	9.15	0.00	0.00	0.00
Solano	18.66	20.32	24.86	11.86	23.58
Sonoma	42.21	45.96	62.49	17.19	32.00
Stanislaus	68.42	74.51	73.07	17.81	23.36
Sutter	7.10	7.73	7.20	1.74	2.03
Tehama	7.46	8.12	4.73	3.85	7.69
Trinity	0.00	0.00	0.29	0.15	0.16
Tulare	31.50	34.30	18.53	3.82	4.17
Tuolumne	0.00	0.00	6.20	3.88	7.75
Ventura	68.42	74.51	154.05	58.42	349.76
Yolo	19.32	21.04	3.92	0.97	2.00
Yuba	4.90	5.34	1.19	0.59	1.34
TOTAL	6045.82	6590.73	4165.20	269.64	788.48

Since most of the error in emission estimates is felt to originate from uncertainty in the emissions from large firms, bottom-up estimates were made separately for firms with sizes of fifty or fewer employees. These results appear in Tables 8-10, 8-11, and 8-12. These results should allow local air districts to use our statistical bottom-up estimates for the smaller firms, with more direct emissions estimates for large firms based on permit and compliance data. Statewide, we estimate that these larger firms (≥ 50 employees) are responsible for about 44% of emissions from this industry. Since much of the variability in some local and statewide estimates is in the small sample of large firms, this approach has great potential for significantly reducing uncertainty in industry emission estimates. Statewide, improved estimates of emissions of large firms could reduce the range of emission uncertainty from over 2.1 million lbs/year to as little as 0.8 million lbs/year (or about 62 percent). Most of this benefit would occur from improved estimates for Los Angeles, Orange, and Ventura counties. Currently, this mixed estimation approach appears to be infeasible for most districts, given their current data acquisition and retrieval systems, but has significant potential in the future as more flexible, standardized, and complete database systems are implemented.

Emission Patterns and Trends

Emissions are found to be concentrated in a small number of air districts. Four districts have rules regulating wood furniture coatings account for an estimated eighty-four percent of emissions. If two additional districts, that do not have rules on this emission source category, are included, this group of six districts accounts for an estimated ninety-five percent of emissions from this source. For these districts especially, the greater part of emissions are contributed by a relatively few large firms.

Although there are a very large number of small furniture and cabinet manufacturers in California, most emissions appear to be produced by medium and large firms as shown below.

Table ES-2. Firm size and Cumulative Percentage of VOC Emissions

Firm Size Category (employees)	Emissions as Percentage of Total Sector Emissions	Cumulative Emissions as Percentage of Total Sector Emissions
1 - 4	5%	100%
5 - 9	4%	95%
10 - 19	26%	91%
20 - 49	21%	65%
50 - 99	20%	44%
100 - 249	13%	24%
250 - 499	11%	11%

The extensive use of finishing shops for furniture coating and the finishing of cabinets by installers complicates the estimation of wood coating emissions because it reduces the data available and increases the uncertainty in what and how coatings are applied. This subject is discussed further in Chapter 8.

Frequent and substantial changes in federal and state regulations applying to wood furniture and fixture manufacturing will likely result in rapid and continuous change in the formulation of wood furniture coatings used in California. Changes in coating formulation will make obsolete the emission factors developed in this study, and thereby increase emission estimate uncertainty. Emission factors must be updated to account for changes in coating formulation. The emission factors are the most difficult portion of the estimation method to update. One way to update emission factors would be to take regulated VOC content limits as upper bounds on VOC content. Assuming that district regulated VOC content represents actual practice would not reflect coating formulation in regions not covered by regulation. Because coating formulation is not well correlated with any independent variables that can be easily measured, as coating formulations change emission factors will have to be updated through a survey of manufacturers or applicators. Ultimately, reduction in this source of error may require greater use of local district permit and compliance data, particularly for large firms.

Future Emission Estimation

Looking toward future emission estimates, with the exception of coating emission factors, the proposed estimation procedure can be updated relatively easily. Updates of industry composition by firm size can be made easily and frequently using U.S. Department of Commerce statistics produced at the county level. The need to update per-firm coating use can be assessed by monitoring of the industry. The need to update coating emission factors also can be assessed by monitoring the industry. In both these cases, updates can be accomplished through a combination of detailed surveys (as we have done here), chemical analysis of specific coatings, and local permit and compliance data.

For improvement in the reliability of emission estimates, we suggest the development of improved data collection and access for permit and compliance data for large firms. While many districts which regulate this industry collect such data, we found that these data were unavailable for emission estimation purposes. In the intermediate and long-term, it should be possible for CAPCOA or other professional groups or districts to develop and implement standards for collection and access which would improve the utility of such data for emission estimation and other purposes.

Exploratory Chemical Analysis of Coating Samples

As an independent project within this study, exploratory sampling and chemical analysis was undertaken of selected wood furniture and fixture coatings. This analysis was undertaken at California Polytechnic University San Luis Obispo, using samples collected by UC Davis. These exploratory results appear in Appendices A and B.

The Cal Poly analysts noted that Glycerol (glycerin, B.P. 290 °C) was present in some water-based coatings. Although unlikely to be determined completely as a VOC by ASTM Method 2369, glycerol exerts a small vapor pressure at room temperatures and will eventually volatilize if unreacted. In comparing the VOC content of the coating reported by the manufacturers, it was evident that glycerol was not being counted as contributing to the VOC content of the coating. The sum of the VOC components determined by GC/MS analyses, excluding glycerol, summed quite closely to the reported VOC content. Therefore, if it is the intent to count the total volatile organic compound content of a solvent released into the atmosphere, ASTM method 2369 is not appropriate to the newer water-based solvent formulations.

1
Introduction

1.1 Problem Statement

State and federal clean air legislation require that a comprehensive baseline emission inventory be developed for all sources of air pollution. Total organic gas emissions from operations based on solvent use represent a significant portion of the emission inventory, and industrial surface coatings are one major category. Emissions calculations from the area source component of this category have been developed in the past based on emission factor and process rate methods, but these methodologies have not been updated in several years. In the subcategory of wood furniture and fixtures in particular, changes in air district rules have affected the formulation and solvent contents of coatings used in coating processes.

The purpose of this study is to update the methodologies for estimating emissions from the industrial coatings subcategory of wood furniture and fixtures. Specific objectives are:

1. estimate the amount of coatings used in the industrial surface coating of wood furniture and fixtures;
2. develop emission factors for each coating application category;
3. estimate variability for both coating use and emission factors; and
4. specify a source of information and method to revise and update the industrial coating of wood furniture and fixtures emission inventory.

This report describes the development of a statistical estimation method that utilizes activity profiles and emission factors developed from survey data and business activity data from the United States Census to estimate emissions from the coating of wood furniture and fixtures in California.

1.2 Uses of Emission Estimates

Both state and federal clean air legislation require that a comprehensive baseline emission inventory be developed for all sources of air pollution. This study is part of the California Air Resources Board's Emission Inventory Improvement Plan designed to meet these legislative requirements for baseline inventories. The baseline inventories may be used in modeling and control measure development with regard to both photochemical and toxic air pollutants.

Federal and State Ambient Air Quality Standards for ozone have been established to protect the public and the environment from the harmful effects of this pollutant. Ozone, the prime component of photochemical smog, is formed when volatile organic compounds (VOCs) react in the presence of sunlight with nitrogen oxide emitted from burning fossil fuel. Volatile organic compounds released from evaporation of organic solvents during the drying of wood furniture and fixture coatings are thus considered precursors of photochemical smog and ozone. The emissions estimates developed in this study combined with other emission data can be used in photochemical smog models to predict local ozone levels around the State.

There is also concern about the toxic effects of compounds used in wood furniture and fixtures coating applications. Reisch (1994) identifies more than 50 compounds used in paints that are identified as hazardous air pollutants in the Clean Air Act of 1990. The emissions estimates developed in this study can be combined with toxic release profiles for wood furniture and fixture coatings to predict toxic air pollutant releases.

In an effort to reduce volatile organic compounds (VOC) and toxic emissions from wood furniture and fixture coating applications, air pollution control districts in California have established specific limitations on the VOC content of coatings for such applications. The emissions inventory developed in this study could be used in the development of a statewide suggested control measure (SCM) for wood furniture and fixtures coating applications, which could be recommended to the districts for adoption into their regulations.

1.3 Organization of Report

The primary product of this study is an emission inventory method for the industrial wood furniture and fixtures coating process. The method provides emission estimates that can be disaggregated in many ways (e.g., emissions by county and district, standard industrial code (SIC) group, or coating category), and a method of updating the emission estimates based on readily available census data. Both the emission inventory and inventory update methods produce estimates of uncertainty.

The estimation procedure is based on extensive surveying of wood furniture and fixture manufacturers, performed during this study. The surveying process produced a wealth of information about this industry. This report describes both the rationale of design of the emission estimation and update methodologies, and how the changing structure of this industry affects current and future emission estimates. Our report is organized as follows: In Chapter 2 we provide background on forces changing the formulation and use of wood furniture and fixture coatings. In Chapter 3, the categorization of coatings used in the estimation process is presented. In Chapter 4, we describe the survey methods and results. In Chapter 5, we examine the geography of wood coating usage and the structure of the wood furniture and fixture coating industry. The emission inventory estimation and update methods are defined in Chapter 6. In Chapter 7, we describe the development of the emission factors for the coating categories. In Chapter 8, application of the inventory method for 1993 is presented and compared to previous estimates. A "top-down" estimate of emissions based on national coating production data is detailed in Chapter 9. Finally, in Chapter 10, we draw conclusions from these analyses and make recommendations regarding the application of these estimation techniques. Two appendices are included that summarize chemical analyses of coating samples. Additional appendices provide survey mailing examples.

2
Background

2.1 Product Categories

The wood furniture and fixture industry encompasses the manufacture of diverse products including cabinets, office furniture, store fixtures and residential furniture. Some of the products coated in this industry are solid wood, while others are composites of wood or paper veneers adhered to particleboard, or other simulated wood products. Some products are very expensive, luxury items that compete primarily on quality; others are low-priced consumer goods that compete primarily on price. The role of coatings varies across this range of products. Coatings on luxury wood furniture are critical to the product's aesthetics and can involve extensive and elaborate application processes, justified by the high cost of fine wood furniture. In lower cost wood products, coating price and protective qualities take on greater importance relative to aesthetics.

For the purposes of this report, the wood furniture and fixture category includes some or all of the production in the following Standard Industrial Codes (SICs):

Wood kitchen cabinets (2434)
Retail sales - Custom wood cabinets (5712)
Wood household furniture (2511)
Upholstered household furniture (2512)
Wood TV and radio cabinets (2517)
Household furniture - not elsewhere classified (2519)
Wood office furniture (2521)
Public building and related furniture (2531)
Wood partitions and fixtures (2541)
Furniture or fixtures - not elsewhere classified (2599)

In this report, all product categories in the above list will be referred to as "furniture" unless further distinction is required. Note that this list does not include the refinishing of antique or previously coated furniture and fixtures, the coating of musical instruments, boats, pieces of art, or architectural wood.

2.2 Coatings and Coating Processes

Despite the broad range of products manufactured in this source category, some steps in the coating process are common. The finish of wood furniture, cabinets, and fixtures consists of all or part of the following materials, generally applied in the order given:

1. size coat and/or bleaching to properly prepare the wood substrate and to insure wood color uniformity;
2. stain or pigmented lacquer toner to achieve the desired pigment color;

3. a wash coat of lacquer of synthetic type to smooth the wood prior to filling;
4. a wood paste filler;
5. wood sealers;
6. glaze and/or shading stains; and
7. one or more coats of clear or pigmented top coat.

Coating of lower priced furniture may involve only a few steps, such as staining, sealing, and top coat application. However, the better grades of furniture may receive as many as twenty-six coats of finish material. For such fine furniture, the quality of the finish is critical for both aesthetics and protecting the furniture.

Traditionally, wood furniture and fixture coatings have contained high concentrations of volatile organic compounds (VOC), in the range of three to seven pounds of VOC per gallon of coating. In the recent past, the demand for low VOC coatings (one to three pounds of VOC per gallon) has increased steadily, and has resulted in the introduction of many low-VOC and water-based wood coating products. For the purposes of this report "low-VOC" coatings have less than 3 pounds/gallon of VOC and "high-VOC" coatings contain more than 3 pounds/gallon of VOC.

Conventional wood and fixture coatings include VOC-containing solvents that evaporate into the atmosphere as the coatings dry. Conventional coatings typically contain two types of solvents: highly volatile "carrier" solvents that allow the coatings to be applied evenly, that evaporate (or "flashes-off") very quickly; and less volatile solvents that evaporate as the coating cures (often in heated drying rooms).

Nitrocellulose is probably the most commonly used conventional wood coating. Nitrocellulose has been the resin of choice for clear wood coatings in the United States since before World War II (Winchester 1991). In the furniture industry, the word *lacquer* is still synonymous with nitrocellulose coatings. Nitrocellulose emulsions have attractive appearance, are easy to apply, dry quickly, have exceptional hardness, and are easily repaired. Unfortunately, nitrocellulose coatings also typically have high VOC content, require the use of organic solvents and thinners during application and clean-up, are highly flammable, and waste portions can be hazardous and require special handling.

The formulation of solvent-based coatings provides two avenues of attack for reducing VOC emissions: alteration of application technologies to eliminate or reduce the amount of carrier solvent needed; and reformulation of coatings to reduce the amount of the volatile reactive organic solvents.

Under regulatory pressure, such as restrictions on coating VOC content, coating users have been switching to low- or no-VOC liquid coatings. Low VOC coatings are attractive because wood finishers are able to use existing spray application equipment and operate without add-on emission controls.

Waterborne coatings have been steadily improving since the late 1980's. There is a wide range of low- and no-VOC coating technologies now used in the wood coating industry. New emulsification processes have allowed coating manufacturers to create high solids, waterborne nitrocellulose lacquers with VOCs of 2.5 to 3.5 lb/gal (Winchester 1991). There are similarly low-VOC waterborne coatings for wood based on nitrocellulose-acrylic latex (Haag 1992). Waterborne coatings do not require solvents for clean-up, are relatively non-flammable, and sometimes require less material for the same coverage area. Disadvantages of waterborne coatings are that they are not as easy to repair and do not dry as quickly as solvent-based coatings, can be more difficult to apply or require more labor, and waterborne coatings do not meet the protective qualities or appearance required in some applications.

There is significant disagreement within the wood coating industry and regulatory agencies about the relative merits of waterborne, low-VOC and conventional wood coatings. The purpose of this study is to estimate current and future emissions from the furniture coating industry in California, not to try to resolve disagreement over the relative merits of coatings and coating technologies. Other research has addressed the evaluation of coating technologies (South Coast 1994; Fray, et al. 1995, South Coast 1996b). Discussion of coating technologies is presented here only as background to the development of emission estimation methodologies that must account for changes and trends in coating use within the industry.

2.3 Regulatory Framework

The wood manufacturing industry in California is regulated by federal, state, and local Air Quality Management District (AQMD) emission rules. In the more industrialized AQMDs of California, the local district rules are the most strict, and are therefore the driving force behind regulatory driven changes in the industry.

At the federal level, wood furniture manufacturers are regulated under two titles of the 1990 Amendments to the Clean Air Act. Title III, section 112 of the Clean Air Act Amendments of 1990 gives the EPA authority to establish national standards to reduce air toxics from emission sources. Section 112(b) contains a list of the hazardous air pollutants (HAP) that are the specific air toxics to be regulated by national emission standards for hazardous air pollutants (NESHAP). The EPA was further directed to use this list of pollutants to develop and publish a list of industries for which NESHAP will be developed (EPA 1995). This list (published in the *Federal Register* on July 16, 1992) contains a category for major sources entitled wood furniture - surface coating. A major source is defined as one that emits or has the potential to emit greater than 10 tons per year of any one HAP or 25 tons/yr of multiple HAP.

The other section of the amended Act that affects wood furniture manufacturers is Title 1, section 183. Section 183(a) requires the EPA to issue control techniques guidelines (CTGs) for 11 categories of stationary sources of VOC emissions. The EPA has issued a CTG for the wood furniture manufacturing industry with the intent of providing guidance to the States for regulating VOC emissions from finishing, cleaning, and wash-off operations at wood manufacturing facilities in ozone non-attainment areas.

Therefore, depending on size and location, a furniture manufacturing facility may be subject to federal regulation of HAP, VOC, or both. Since a majority of wood manufacturing firms in the United States are located in urban areas that do not meet air quality standards, as a practical matter, the law effectively forces most manufacturers to make all their liquid coatings at least meet the federal standards (Reisch 1994).

The EPA has recently finished developing a NESHAP for the wood furniture source category via the regulatory negotiation (Reg.-Neg.) process. Approximately 500 pages of VOC and HAPs information resulting from the Reg.-Neg. process has been condensed in the form of an article in *Wood & Wood Products Magazine* that appeared in

December 1994. The impact of the NESHAP for wood furniture surface coatings is that as the NESHAP is phased-in, emission estimate updates will need to account for changes in the VOC and HAP content of wood furniture coatings.

In California, emission regulations aimed specifically at the wood furniture industry are generally promulgated by the regional AQMDs. Most of the wood furniture industry in California is concentrated in the more industrialized air districts in southern and central California. Many of the rules aimed at the wood furniture industry are patterned after the South Coast Air Quality Management District's (SCAQMD) Rule 1136. Rule 1136 has been amended several times in response to changes in other SCAQMD emission regulations and industry concerns. Although Rule 1136 requirements have been modified in response to industry concerns regarding costs and ability to comply, frequent rule changes have created an atmosphere of regulatory uncertainty in the industry.

Example AQMD rules for VOC limits for wood coatings appear in Tables 1-1 and 1-2 for the Santa Barbara AQMD and San Joaquin Unified Air Pollution Control District, respectively. As can be seen on both Tables 1-1 and 1-2, the VOC emissions that can be expected in AQMDs with wood coatings rules will change dramatically over the next five years. This regulated change in wood coating VOC content greatly complicates future emission estimates based on current usage patterns.

Another requirement of most AQMD wood coating regulations is that furniture makers keep records of coating usage and VOC content. These records could be very helpful in updating emission estimates for this source category if they were collected and maintained in a standard format. Although only a few districts have wood coating rules, these are the districts that have the highest use rates and thus the largest emissions from this source. Unfortunately, the districts each have different formats for the required record keeping, including, different reporting periods, and often the district rules require only that coating usage data be "made available" to the districts. The districts may not actually collect these data, rather they are used for checking compliance when district inspectors visit the applicators' facilities. The district's own emissions estimates for wood furniture coatings are typically not based on the applicator usage records required in the local rules, rather they are based on survey data, often four to six years old. Lack of coordination of reporting requirements among the local districts and with the Air Resources Board may be a lost opportunity for valuable emission data. Coordination and streamlining of reporting requirements would allow multiple and potentially more economical use of emissions data, while perhaps reducing regulatory reporting burdens on industry. CAPCOA might provide consistent guidance and protocols for data collection, storage, and transmittal of these data that over time. Since acetone was included in the MSDS's used in this study, acetone is included in the VOC emission results of this report.

Table 1-1. Organic compound standard schedule for Santa Barbara Air District.

	Regulated Organic Compound Limits (less water and exempt compounds)							
Effective on or after:	1/1/94		7/1/95		7/1/97		7/1/99*	
	(g/L)	(lb/gal)	(g/L)	(lb/gal)	(g/L)	(lb/gal)	(g/L)	(lb/gal)
Clear topcoats	700	5.8	550	4.6	550	4.6	275	2.3
Filler	500	4.2	500	4.2	500	4.2	275	2.3
High-solid stains								
Non-glaze	800	6.7	700	5.8	700	5.8	240	2.0
Glaze	700	5.8	700	5.8	700	5.8	240	2.0
Inks	500	4.2	500	4.2	500	4.2	500	4.2
Mold-seal coatings	750	6.3	750	6.3	750	6.3	750	6.3
Multi-colored coating	685	5.7	685	5.7	350	2.9	275	2.3
Pigmented coating	700	5.8	600	5.0	350	2.9	275	2.3
Sealer	700	5.8	550	4.6	550	4.6	275	2.3
	Reactive Organic Compound Limits							
Low-solids stain, toner, or washcoat	800	6.7	480	4.0	480	4.0	120	1.0

* These limits will be withheld from the State Implementation Plan until their actual implementation.

Table 1-2. VOC Limits for San Joaquin Unified Air Pollution Control District.

Effective on or after:	12/19/96		1/1/99	
	(g/L)	(lb/gal)	(g/L)	(lb/gal)
Clear topcoats	550	4.6	275	2.3
Filler	500	4.2	275	2.3
High-solid stains	700	5.8	240	2.0
Inks	500	4.2	500	4.2
Mold-seal coatings	750	6.3	750	6.3
Multi-colored coating	275	2.3	275	2.3
Pigmented coating	550	4.6	275	2.3
Sealer	550	4.6	275	2.3
Low-solids stain*	480	4.0	120	1.0

* These limits are in mass of VOC per volume of material. Other limits are per volume of coating.

3
Coating Categorization

3.1 Coating Types and Uses

As described in Section 2.2, there are many different coating materials and processes used in finishing wood furniture and fixtures. Coating categories are generally divided using a functional taxonomy. Typical categories include:

Σ solvents and additives;
Σ washcoats;
Σ fillers;
Σ sealers and sanding sealers;
Σ stains;
Σ multi-colored coatings; and
Σ clear or pigmented top coats.

Coating materials and coating processes vary significantly with the type and quality of furniture coated. Similarly the VOC emissions from coatings will vary with coating type, specific formulation, and use. This high degree of variability in coating use and VOC content requires that wood furniture coatings in an activity-based estimation process be subdivided into categories of similar VOC emission characteristics. This chapter describes how wood furniture and fixture coatings are categorized for this study.

3.2 Objectives of Coating Categorization

Categories must be chosen so that the emission estimate provides information useful for the intended end-uses, including emission inventories, air quality modeling, and air quality management. The goals of this study are to estimate the emission of volatile organic compounds (VOCs) from the use of industrial surface coatings in the wood furniture and fixture industry and to assess the accuracy of these emission estimates. A constraint is that the emissions estimate must be based on measurements of coating usage and formulation within the wood furniture industry; thus coating categories must be chosen so that required data are obtainable.

For estimation purposes, the broad range of coatings used in coating wood furniture must be divided into subcategories. In any statistical estimation procedure, dividing a sample into smaller groups can *increase* the accuracy of the estimate by reducing the "averaging" effect of lumping disparate items together. However, too much of this division process can also *decrease* accuracy because it necessarily reduces the number of samples within each subcategory and can thereby increase the statistical variance. Thus subcategories should be chosen to minimize estimation error by balancing the error causing impacts of aggregation and disaggregation of coating categories.

3.3 Coating Categorization

The wood furniture finishing material categorizations defined in existing and proposed regulations were taken as the starting point for categorization in this study. Working from the categorization presented in the proposed NESHAP for the wood furniture source category (EPA 1995), the requirements of estimation accuracy were considered.

To minimize error in the VOC emission estimates, it is desirable that the VOC emission characteristics of coatings within a category be as similar as possible. However, uniform VOC content must be balanced against increasing sample variance due to decreasing sample size within the categories as categories proliferate. This optimization of categories was performed by assembling a large list of wood furniture coatings, sorting them in a variety of ways that would be useful in data collection, and evaluating the resulting groups of coatings based on commonality of VOC content, HAP content, and number of coatings within each category.

Data were collected for 238 wood furniture coatings sold in California by 33 different manufacturers. Coating data were collected from material safety data sheets (MSDSs) and product specification sheets provided by coating manufacturers and applicators. The data were loaded into a computer database for sorting.

Many trial sorting rules were tested, including: solids content, VOC content, primary HAP constituents, solvent type, and use. Traditional application-based groupings aid in data collection because finishers organize their coatings by application, but VOC content was found to be poorly correlated with application.

The finishing material categories selected are based on a combination of coating use and solvent type. Each of the following application groups is divided into two subgroups, "Low-VOC" and "High-VOC":

- stains
- washcoats
- sanding sealers
- sealers (other than sanding sealers)
- topcoats
- enamels
- fillers
- colored coatings
- additives and thinners (only solvent-based category applicable)
- other coatings not elsewhere classified

Low VOC coatings contain less than three pounds of VOC per gallon. The "Low-VOC" subcategories are composed largely of water-based coatings but not exclusively so. This categorization results in relatively large samples that are reasonably similar in VOC content (and to a lesser extent similar in HAP content).

4

Survey Methods and Results

4.1 Overview of Surveys

It is desirable that estimates and forecasts be based upon as much measured data as possible. Toward this end, data were collected through a variety of formal and informal surveys. The formulations of wood furniture and fixture coatings have been evaluated through a survey of coating manufacturers. Data on the regulation of coating formulation and use have been collected through a survey of air districts and district rules. Information regarding wood furniture manufacturing practices and coating use have been gathered through site visits, a phone survey, and two mail surveys of manufacturers (i.e., coating applicators). These survey procedures are described in more detail in the sections that follow. The surveys of coating applicators were by far the most involved and accordingly the majority of this chapter is devoted to describing the methods and results of these surveys. Efforts were made to extend and verify the survey data using permit and compliance data from local air districts. However, the several districts questioned appeared not to have this type of data or data access capability.

4.2 Coating Formulator Survey

Thirty-three manufacturers of wood furniture and fixture coatings were surveyed by telephone for coating VOC and toxic content data. Coating manufacturers were identified using the *Paint Red Book* (Argus 1994). Generally, manufacturers and coating manufacturer trade organizations were unwilling to reveal California specific sales volume information, however they were willing to provide (as required by law) VOC and toxic content data. Data were requested by telephone from a total of forty-two firms. Coating data (generally in the form of material safety data sheets) were received for two hundred and thirty-eight wood coating products from thirty-three firms. (A number of firms also provided data for coatings not applicable to wood furniture. These data were not retained.) The coating VOC data were used to estimate emission factors for each coating category, as described in Chapter 7.

4.3 Applicator Phone Surveys and Facility Visits

Formulating a useful survey questionnaire and estimating emissions requires an understanding of how firms in the wood furniture industry carry out their business. Possibly important information includes: application processes, emission control devices used, what coating usage records are kept, what waste materials are disposed, what services are contracted out, and what products are purchased from outside of California. To gather this type of information, we made a series of visits to furniture manufacturing facilities, performed an informal telephone survey of wood furniture manufacturers, and then tested prototype survey questionnaires through phone surveys.

Five visits were made to four different furniture manufacturing facilities in the greater Sacramento area in northern California. Two firms were medium size furniture manufacturers employing 25-30 workers. One firm was a small cabinet shop employing 6

- 10 workers, and one was a large firm that employs 75 or more workers and specializes in high quality furniture. During these visits we viewed manufacturing and wood coating procedures, and discussed all aspects of the business operations including inventory, waste disposal, regulatory compliance, marketing, and distribution.

The applicator survey questionnaire was developed through an iterative process. At the outset, the exact nature of the data that furniture manufacturers would be able to supply as well as the data requirements for the emission estimators were unknown. The survey form was initially formulated to be very broad in order to gather all data that might be needed in emission estimation. Through telephone interviews with furniture manufacturers we refined the form and content of the survey. The survey form was further reviewed and refined through consultation with the ARB. The refined survey was then tested by distribution to four wood furniture manufacturing firms (only one of which was visited during the site tours). The responses of this small sample of (cooperative) firms indicated that the survey was reasonable and not overly burdensome.

4.4 Applicator Surveys

Wood furniture manufacturers were surveyed by mail to gather data on the types of coatings used and how they are applied. This section describes the mechanics of the survey process, such as how the survey sample was assembled, how the survey questionnaire was developed and tested, how the survey was administered, and the results of the survey process (e.g., response rate, profile of responding firms). In addition, the survey process collected other wood coating information that may affect future air pollutant emission estimates or regulation of this industry. These data also are presented.

The survey of wood furniture manufacturers was distributed in two separate mailings. As described in detail below, the first mailing contained a cover letter on University of California letterhead and a survey form. This mailing resulted in what appeared to be a very low response rate. A second mailing of a shortened survey form and California Air Resources Board letterhead was subsequently made to those firms that did not respond to the first survey mailing. The use of a shortened survey form (11 questions) in the second mailing resulted in different surveyed populations for some of the survey questions. A detailed discussion of survey methods appears below.

4.4.1 Development of the Survey Sample

The survey sample was generated from lists of manufacturers of wood furniture and fixtures obtained from the regional Air Quality Management Districts, the California Air Resources Board, and a commercial mailing list company.

Several trade organizations were contacted in an effort to expand our survey list and gather coating usage information. The organizations contacted were: American Furniture Manufacturers Association in High Point, North Carolina; National Paint and Coatings Association, Inc., Washington, D.C.; and the Kitchen Cabinet Manufacturers Association, Virginia. None of these organizations were able or willing to supply the names of wood coaters in California or coating usage information.

Specifically, lists from the South Coast, Bay Area, and Sacramento Districts were combined with a mailing list purchased from the American Business Lists (ABL)

Corporation. Lists were requested from all other districts with large concentrations of wood coating operations (e.g., Ventura, San Diego, and San Bernardino), but no such lists were available. In addition, telephone book yellow pages were used to include firms from smaller districts. The firms on the aggregated list represent a very large statistical sample of the wood furniture and fixture manufacturers. The list does not include all firms that use these coatings. The list does not include furniture refinishers and firms such as musical instrument manufacturers that may use such coatings, but do not manufacturer wood furniture and fixtures. The list includes a random sampling of firms - both permitted and unpermitted. The majority of firms on the list are unpermitted. Unpermitted sources produce a significant portion of the emissions from this coating category.

The 10 SIC codes for which addresses were requested from ABL are presented in Table 4-1. The ABL mailing list was organized by county and 4 digit SIC code, and includes contact names and phone numbers, sales volumes, employee sizes, and zip codes. The list was obtained on computer disk in Microsoft Excel® format so it could be sorted as required in the survey process. Lists of firms received from the Air Districts were entered into the same EXCEL spreadsheet database and sorted by county and air district. The resulting full list contains 1,703 firms in the 10 SIC codes of interest. The 1992 U.S. Census counted 1,960 California firms in the same 10 SIC codes, so the list size is relatively consistent with census business pattern data. However, as discussed later in this chapter, some of the firms on the full list were either retailers or manufacturers of non-wood furniture. Representation by county of firms on the survey list is tabulated in Table 4-2.

Table 4-1. Wood Furniture and Fixture SIC Categories.

SIC Code	Description
2434	Wood kitchen cabinets
5712	Custom wood cabinets
2511	Wood household furniture, except upholstered
2512	Upholstered wood household furniture
2517	Wood T.V., radio, and sewing machine cabinets
2519	Household furniture not elsewhere classified
2521	Wood office furniture
2531	Public building furniture
2541	Wood partitions, shelving, and fixtures
2599	Wood furniture and fixtures, not elsewhere classified

Table 4-2. Representation by county on survey list.

County	Number of firms on list
Alameda	138
Butte	3
Contra Costa	54
Del Norte	1
El Dorado	4
Fresno	13
Humboldt	3
Kern	8
Kings	4
Lake	1
Los Angeles	696
Madera	2
Marin	44
Mariposa	1
Mendocino	1
Merced	4
Monterey	5
Napa	14
Nevada	4
Orange	109
Placer	6
Riverside	40
Sacramento	23
San Bernardino	59
San Diego	105
San Francisco	137
San Joaquin	10
San Luis Obispo	5
San Mateo	44
Santa Barbara	5
Santa Clara	72
Santa Cruz	6
Shasta	1
Solano	14
Sonoma	32
Stanislaus	14
Sutter	3
Tehama	1
Tulare	2
Tuolumne	2
Ventura	10
Yolo	3
Total	1703

4.4.2 Distribution of the Survey Questionnaire

The first mailing of surveys, carried-out in June and July of 1995, included a cover letter on UC Davis stationary explaining the purpose of the survey and requesting the recipient's cooperation in returning the survey, a postage-paid business return envelope, and the survey form. The cover letter, non-disclosure agreement and survey form used in the first mailing are included as Appendices C, D, and E of this report. The first survey requested coating use data over the period June 1, 1994 - May 31, 1995. UC Davis stationary was selected for the cover letter in the hope that it would encourage a higher response rate. During telephone interviews with potential survey recipients, we detected wide-spread animosity among furniture manufacturers toward regulatory agencies. The cover letter text was drafted by the ARB, and cites the rules and laws under which the survey data were being requested and clearly states that the data were being requested at the behest of the ARB.

After the first survey was mailed, follow-up letters were sent to 1,023 firms that had not responded. Phone calls were made to those that had returned surveys, but where data were missing or incomplete. There was no attempt at a telephone follow-up of those that did not respond at all. This was partly because of the large number of inappropriate addresses in the list and the inability to identify those before calling.

Because the number of useful responses generated by the first mailing was deemed to be insufficient for emission estimation purposes (response rates are described later in this chapter), a second mailing of surveys was made to <u>all</u> firms that had not responded in some way to the first mailing. This second effort represents a significant effort to thoroughly survey firms in this industry. A very large percentage of the wood furniture manufacturers operating in California were contacted during the survey process, and many were contacted two or more times.

The second mailing included a modified cover letter on ARB letterhead, a nondisclosure agreement, a postage-paid return envelope and a shortened survey questionnaire. The cover letter, nondisclosure agreement, and survey form of the second mailing are included as Appendices F, G, and H of this report. The second survey, mailed during in June 1996, requested coating use data over the period January 1, 1995 to December 31, 1995.

A summary of the contacts with survey sample are presented in Table 4-3.

Table 4-3. Number of contacts with survey sample.

Type of contact	Mailing #1	Mailing #2	Total Mailings
Advance telephone call	50	28	78
Survey with postage paid envelope	1547	970	2517
Follow-up letter	1023	0	1023
Telephone follow-up	68	6	74

4.4.3 Survey Responses

As completed surveys were received, they were logged-in and examined for completeness. Properly completed surveys were sorted by county and air district and queued for data entry. Incomplete or improperly completed surveys were queued for a follow-up telephone call. Data were entered from the survey forms into an EXCEL spreadsheet database.

Survey response rates are summarized in Table 4-4. The response percentages in Table 4-4 are calculated from the total number of surveys mailed in each mailing and overall. Clearly these rates are somewhat misleading because the total number of eligible firms that received a survey is a much smaller number.

Table 4-4. Summary of survey response results.

Type of response	Mailing #1	Percent	Mailing #2	Percent	Total Mailings	Percent of Total
Returned by post office	153	9.9	159	16.4	312	12.4*
Survey does not apply#	185	12.0	44	4.5	229	9.1*
Survey completed	104	6.7	20	2.1	124##	6.3**
Firms Responding***	104	6.7	20	2.1	124##	11.4***

* Percent of total mailings (2517)

** Percent of total mailings presumed to reach applicable firms (1976=2517-312-229)

*** Percent of presumed applicable firms (1087); multiple mailings were made to most firms.

The survey form used in the first mailing did not ask for a reason if the survey was deemed not applicable by a responding firm. Thus it is impossible to differentiate between those firms in the first mailing that sell unfinished furniture, contract out finishing, or do not finish any wood furniture or fixtures.

Data used in the estimation procedure include an additional 41 respondents to a survey conducted by the Sacramento Metropolitan Air Quality Management District, resulting in a total of 165 firms.

The ABL list included many entries that no longer represent an active firm at the business address identified in the list. Many of these firms classified under SIC 2599 ("wood furniture and fixtures, not-elsewhere-classified") turned-out to not truly be wood furniture manufacturers, but rather retailers of furniture, manufacturers of wrought-iron or glass furniture, or firms with manufacturing performed outside of California or the U.S. In addition, from the first mailing, 153 surveys were returned as undeliverable. In the second mailing, 159 surveys were returned as undeliverable. Of 68 telephone follow-ups of non-respondents to the first mailing, 32 firms informed us that they are not currently engaged in wood furniture or fixture coating operations relevant to the survey. Information about these entries is useful in interpreting the response rate for the survey, since it indicates that the survey reached far fewer relevant firms than the original 2517 mailings.

Based on follow-up results, we can estimate the number of surveys that eventually reached an eligible firm. A conservative estimate assumes that surveys reached a coater of wood furniture unless (1) they were returned by the post office, or (2) they were returned and indicated that the survey did not apply, or (3) telephone follow-up indicated that the firm did not coat wood furniture. Using this assumption, the number of surveys that reached eligible firms is estimated to be 1944. If the additional assumption is made that the percentage of firms to which the survey does not apply would be similar for the 1820 firms with whom we were unable to follow-up, the number of surveys reaching eligible firms is estimated to be 1087.

We received 124 completed questionnaires. Using 1087 as a reasonable estimate of the number of surveys that reached eligible firms, the survey achieved a response rate of 11.4 %. This participation rate is somewhat lower than results for other mail surveys of professional groups which tend to achieve around 20% participation. A possible reason for low participation is that many firms report coating usage data to their local districts and feel that the data should be available through the districts. Another plausible reason is fear that regulatory agencies will use coating data to justify additional regulation. The existence of these sentiments among wood furniture manufacturers is supported by our survey results which are presented in the next section of this report.

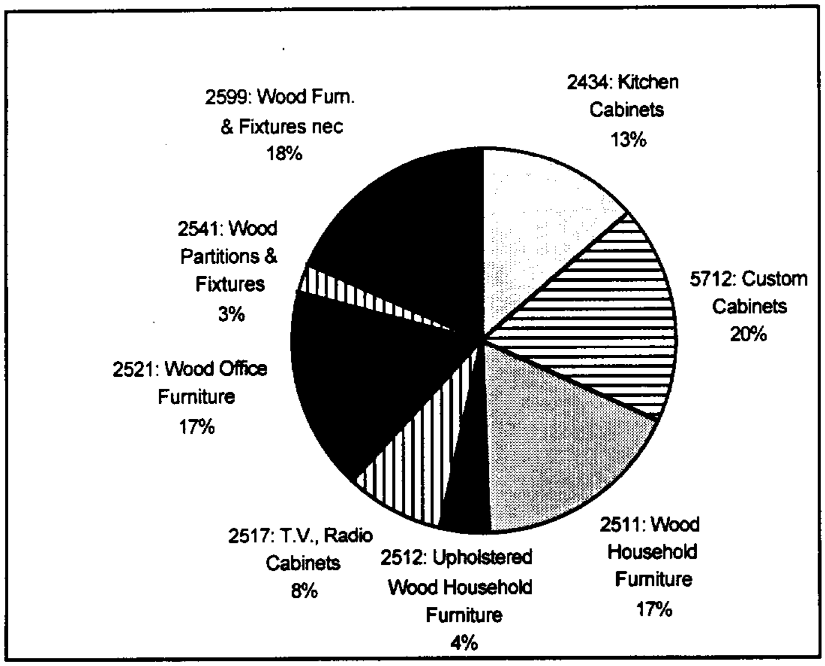
4.5 Applicator Survey Results

This section describes information gathered through the survey of wood furniture manufacturers that is not directly applicable to the emission estimate process, but is very valuable in understanding the practices and sentiments of firms in the industry. This section includes a profile of the responding firms, information on how and when coatings are applied, and how regulations impact the furniture manufacturing industry.

4.5.1 Respondent Firm Profile

The percentage of applicator survey respondents in each SIC code is shown in Figure 4-1. If firms indicated more than one "primary" SIC, the multiple responses were included in this chart. The largest group represented are cabinet makers at 33 percent, followed by manufacturers of household, office, and "other" furniture, each representing approximately 17 percent of the sample.

Figure 4-1. Respondent firm's primary product (by SIC code). Multiple responses allowed.



Respondent firm size in terms of number of employees is presented in Figure 4-2. The distribution of firms by number of employees generally reflects the size distribution of firms in the State according to census data. Naturally, because there are a small number of large wood furniture manufacturers, the number of responses from firms in the larger size groups is small. For example, firms that employ between 250 and 500 employees make-up only three percent of the sample. Although statistical estimation of emissions from such a small sample will result in a highly uncertain estimate, these firms will very likely be required to report their emissions directly to the districts and the CARB as part of point-source inventories. Emissions from large firms could be omitted from this area emission estimation procedure and their emissions (as reported under the point source inventory) added to the area emission estimates to obtain total emission estimates. Representing large firms with direct estimates from local district permits and compliance data, removing them from this estimation procedure, would greatly reduce overall uncertainty, a large part of which will be due to the statistical uncertainty associated with the few large firms. This is a promising direction for the future, provided that district data collection and retrieval systems can be adapted to this use. Except as noted, the estimates presented in this report include all industry firms (and associated uncertainties).

The distribution of surveyed firms by air quality management district is presented in Table 4-5. The number of surveyed firms in Table 4-5 from the Sacramento Metropolitan Air Quality Management District (SMAQMD) includes 40 firms surveyed by the SMAQMD. Data from this district survey are compatible with our survey data and their use increases our sample size and thus estimation confidence. The disadvantage of using these data is that firms from this region are thereby more highly represented in the sample. However, the coating use of firms from the SMAQMD were not found to be significantly different from similar firms in other districts (including those with rules regulating wood furniture and fixture coating), and so these data have been included in the estimation procedure (but not in the qualitative data presented in this Chapter). Table 4-5 also indicates the percentage of firms in each air district responding to our questionnaires, estimated using 1992 Census data for the industry.

Figure 4-2. Average number of employees (including administrative personnel).

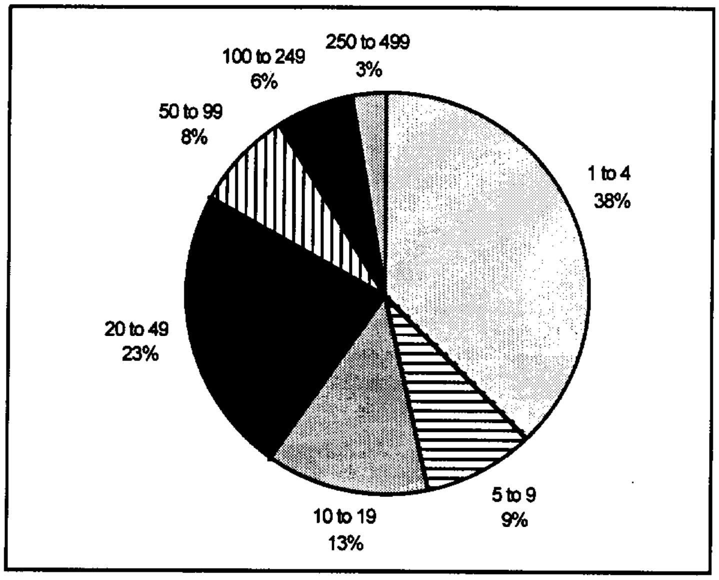


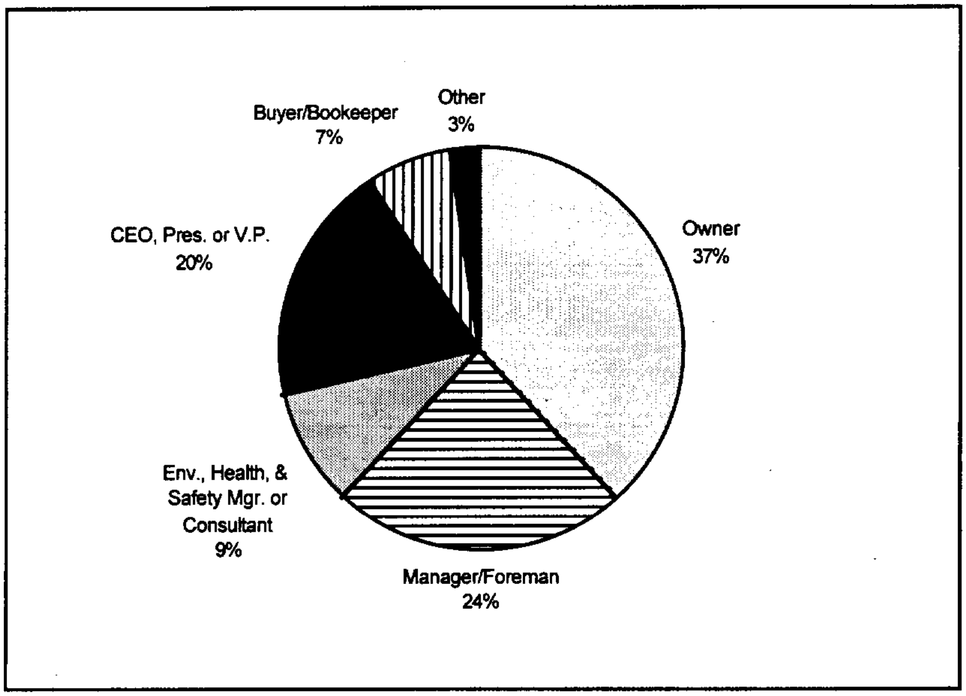
Table 4-5. Air district representation among respondent wood coating firms.

Air District	Number of responding firms	Percentage of respondents	Percentage of firms in air district
Bay Area	40	24.4%	9.1%
El Dorado	1	0.6%	8.1%
Monterey	3	1.8%	11.2%
North Coast	1	0.6%	7.7%
North Sonoma	1	0.6%	13.0%
San Joaquin	4	2.4%	3.6%
Sacramento Metro*	42	25.6%	70.0%
South Coast	63	34.8%	6.3%
San Diego	3	1.8%	2.5%
Ventura	6	3.7%	27.3%
other air districts	0	0	0
Total Statewide	124	100%	6.6%

* Includes 40 responses from survey performed by SMAQMD.

The position of the person at the firm completing the survey is presented in Figure 4-3. Consistent with the large number of small and medium size firm, the majority of respondents are the owner or chief official of the firm (57%). "Manager or Foremen" is the next largest group of respondents at 24%, with environmental health and safety officers or consultants, buyers, bookkeepers, and other representatives making-up the remaining 19% of respondents.

Figure 4-3. Position at firm of person completing survey.



4.5.2 Use Pattern Information

The remaining qualitative survey questions generally apply to how and when coatings are applied. These qualitative questions were eliminated from the survey questionnaire for the second mailing of the survey because they were thought to make the survey overly long and thus might reduce response rate and the information that they provide is not critical to the emission estimation process. However, the information gathered through these qualitative use questions does provide valuable insight into how wood furniture and fixture coating firms operate. Therefore, the results of this limited survey effort is report here.

In this section the survey question as it appears on the survey questionnaire is printed in **bold**. The survey results are presented in tabular form, occasionally augmented with a graphical presentation. Because the answers to the qualitative questions were not deemed critical, if a respondent did not answer a question in this section, we did not follow-up by telephone to obtain the missing information. Therefore, the number of responses to these questions varies. The total number of respondents to each question is presented in each table. Any investigator comments regarding the results are printed in *italic* following the tabular or graphic presentation of results.

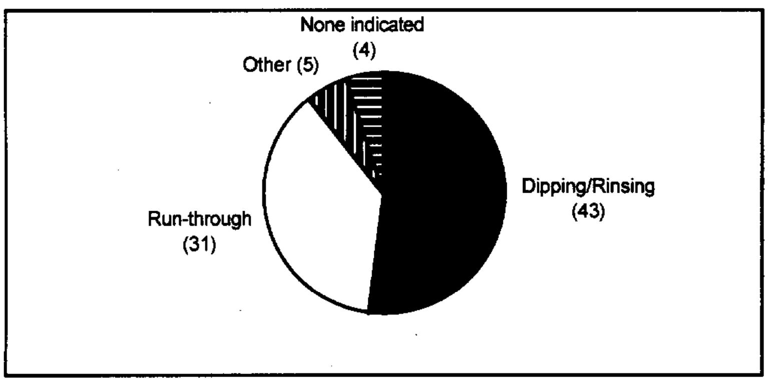
4. Do you use solvents in clean-up of wood coating equipment?

Yes	72
No	14
	n = 86

5. Do you clean application equipment by dipping/rinsing or by running solvent through the application equipment?

Dipping/rinsing	43
Run-through	31
Other	5
None indicated	4
(multiple responses are allowed)	n = 72

Figure 4-4. Method of cleaning application equipment. Multiple responses allowed. (n = 72).



The majority of wood furniture applicators use solvents in cleaning their application equipment and the most common method of cleaning is dipping or rinsing. Dipping and rinsing results in much higher solvent evaporation rates (and VOC emissions) than running solvent through the equipment to clean it.

7. Do you manufacture or formulate any of the wood coatings you use?

Two firms out of 104 indicated that they formulate some of the coatings they use.

__The following questions apply to coating usage over the next five years.__

8. Do you anticipate a change in the amount of "low-VOC" coatings your company uses? ☐ Yes ☐ No

If so, will your firm use "low-VOC" coatings:

☐ exclusively?

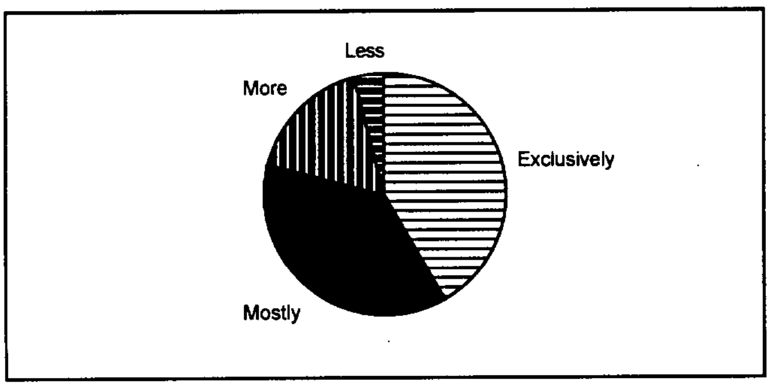
☐ mostly?

☐ more?

☐ less?

Yes	25
No	10
	n = 35

Figure 4-5. Anticipated changes in amount of "low-VOC" coatings used over next five years. (n = 24).



A large majority of respondents indicated that they will use "low-VOC" coatings "mostly" or exclusively" within the next five years. This response indicates a rapid increase in the use of 'low-VOC" coatings, and will require that coating emission factors based on current usage patterns be updated in order to assure accurate emission updates.

9. Is the anticipated change motivated by:

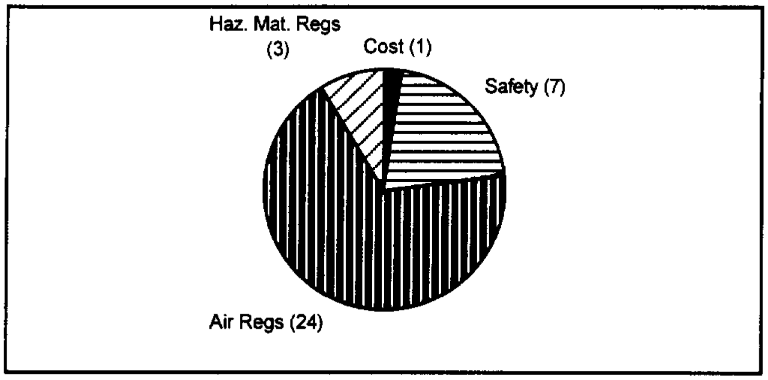
☐ cost considerations?

☐ safety considerations?

☐ existing or anticipated air pollution regulation?

☐ existing or anticipated hazardous waste regulation?

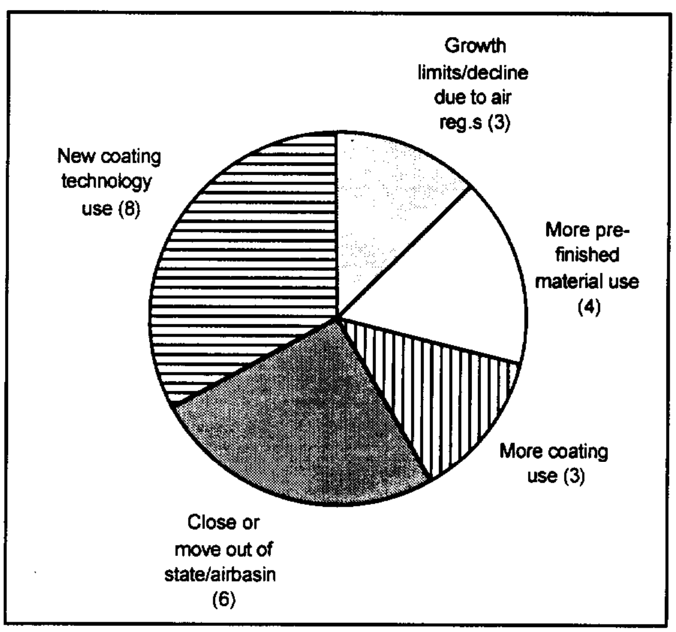
Figure 4-6. Reasons given for anticipated changes in amount of "low-VOC" coatings used over next five years. Multiple answers allowed. (n = 25).



Note that 96 percent of respondents cite "air pollution regulations" as a reason for increased use of "low-VOC" coatings over the next five years. The next most common reason cited is "safety", followed by "hazardous material regulations" and "Cost" (which was cited by the one respondent who anticipates less use of low-VOC coatings over the next five years).

10. In what other ways do you see your use of wood furniture and fixture coatings changing in the next five years?

Figure 4-7. Other changes in coating use anticipated over next five years. Multiple answers allowed. (n = 20).



As indicated in Figure 4-7, thirty percent of firms suggesting possible changes in their use of wood furniture coatings over the next five years indicate that they will close or move their businesses. A full forty-five percent anticipate either closing, moving, or reducing their businesses. Although only twenty firms responded to this question, this is a strikingly gloomy business outlook. Twenty percent of firms indicate that they will use more pre-finished materials and forty percent will use some type of new coating technology. Only fifteen percent anticipate using more coatings over the next five years.

11. Are these changes motivated by:

- ☐ **business growth? If so, _______ % annual growth anticipated.**
- ☐ **cost/performance considerations?**
- ☐ **existing regulation?**
- ☐ **anticipated regulation?**

Table 4-6. Motivation for other changes in coating use anticipated over next five years. Multiple answers allowed. (n = 20).

	Motivation for anticipated change		
Anticipated change	Regulation	Cost/performance	Business growth
New coating technology use	5	3	4
Growth limits/decline due to air regulations	3	0	0
More pre-finished material use	3	3	2
More coating use	0	0	3
Close or move out of state/air basin	5	1	0

As shown in Table 4-6, the most common reason for anticipated changes in coating use is air pollution regulation. The only change not most strongly motivated by regulation was an increase in coating use. Of the six firms anticipating closing or moving, five cite air pollution regulation as the cause.

12. **Does your facility have peak production seasons (e.g., pre-Christmas bulge)?**

Table 4-7. Peak production periods and amounts reported. (n=14).

Primary SIC	SIC Description*	Peak production season and proportion of annual production
2511	wood household furniture	Nov-Dec 30%
2599	wood furniture & fixtures nec	Oct-Dec15 25%
2511	wood household furniture	Oct-Jan
2511	wood household furniture	Oct-Dec 20% **
2521	wood office furniture	Sept-Jan 60%
2512	upholstered household	Sept-Dec 36%
2599	wood furniture & fixtures nec	Sept-Dec 40%
2511	wood household furniture	early Aug-late Jan 75%
2599	wood furniture & fixtures nec	Aug-mid Nov 35%
5712	custom wood cabinets	July-Sept 25%
2434	wood kitchen cabinets	June-Nov 70%
2521	wood office furniture	June-Sept 40%
2511	wood household furniture	March-July 70%
2599	wood furniture & fixtures nec	March-Sept 60%

** Note that some estimates of peak production rate are less than expected if production is uniform throughout the year.

Although only fourteen firms report having any peak production period, of those firms that do have production peaks, Cabinet and office furniture manufacturers appear to have Spring and Summer peak production periods, while household furniture manufacturers have Fall or pre-Christmas peak production periods. Again, this is too small of a sample to generalize from, but the result is suggestive of a possible trend.

13. **During what hours are coatings applied (e.g., between 7:00 a.m. and 5:00 p.m.)?**

Table 4-8. Average coating application periods. (n=63).

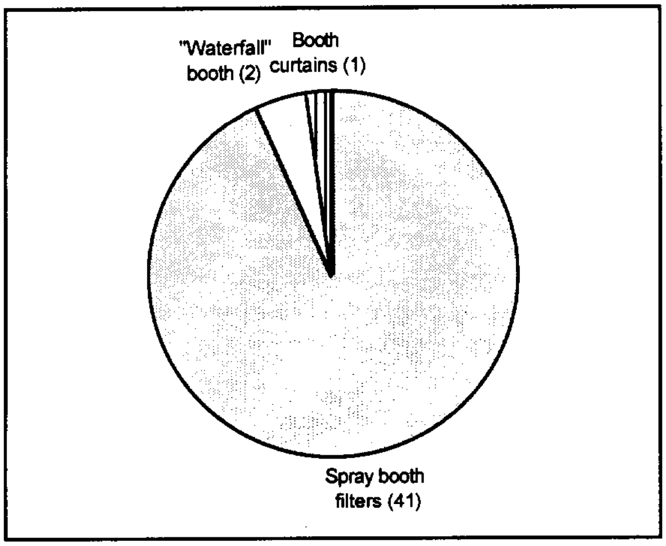
	Start time	Finish time	Elapsed time (hrs.)
Mean (time)	7:14 a.m.	4:00 p.m.	8:46
Standard deviation (hrs.)	1:01	1:27	1:37

As shown on Table 4-8, there is relatively large variation in the hours during which wood furniture and fixture coating is performed. Typically coating is done throughout the day and shifted slightly toward the morning hours.

15. What type of filters or emission controls do you have on your drying room or facility to control air emissions (if any)? ☐ None

Air emission control devices used	43
None	25
	n = 68

Figure 4-8. Types of air emission control devices in use. Multiple answers allowed. (n = 43).



16. What type of filters of emission control devices are you considering or planning? ☐ None

Table 4-9. Emission control devices planned or considered. (n=46).

Planned or considered emission control devices	Number
Fiberglass filters	1
"Waterfall" spray booth	1
None	44

The responses to questions 15 and 16 indicate that few "high-tech" emission control devices are used in this industry. The majority of firms have fiberglass filters on their spray booths and few are planning to install more effective control measures.

17. Do you currently recycle any used or waste wood coatings?

☐ **Yes** ☐ **No**

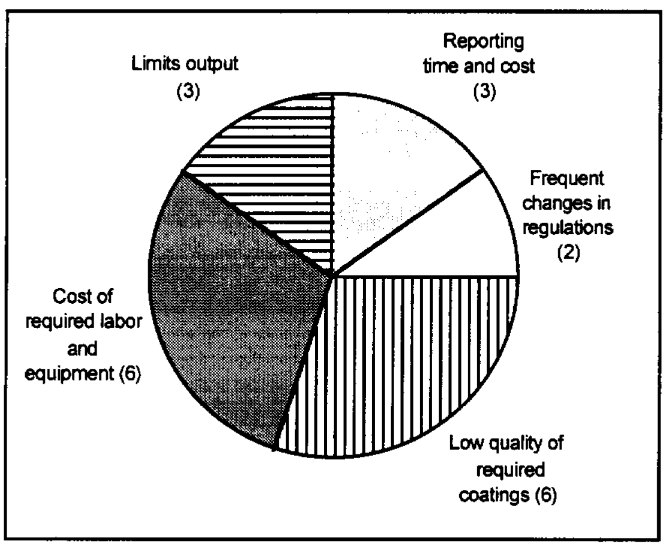
Yes	13
No	23
	n = 36

18. How do furniture coating usage or emission regulations affect your business at this time? ☐ **Not significantly**

Significantly	16
Not significantly	17
	n = 33

Although responses to questions 10 and 11 indicate that air regulations are perceived to have a highly negative impact on future businesses in this industry, only half of the respondents to question 18 feel that air pollution regulations significantly affect their business at this time. The ways the regulations have a significant impact on their businesses are shown in Figure 4-9. The most common impacts are increased costs and lowered product quality. Other impacts described are the time and cost of reporting, frequent changes in regulation, and limiting of production rates (primarily due to increased drying time required by low-VOC coatings).

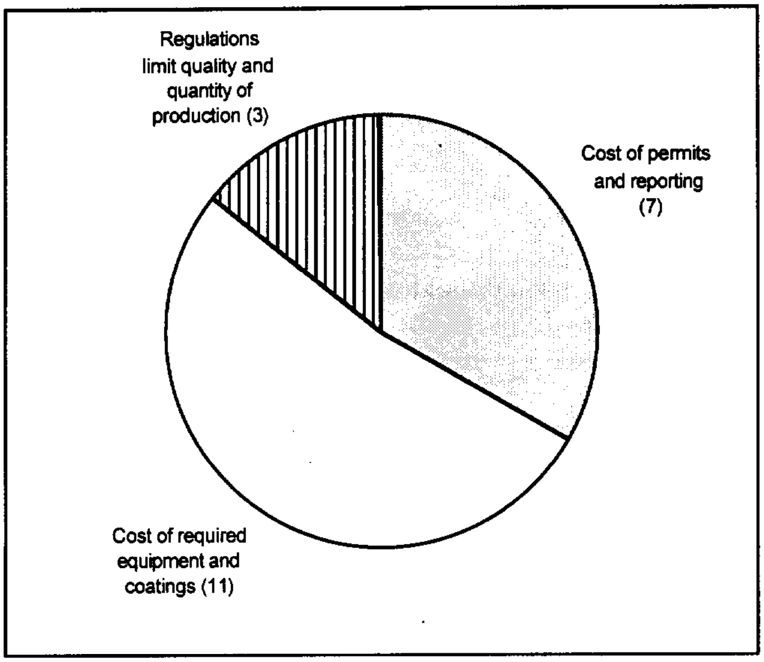
Figure 4-9. Coating use and emission regulation impacts. Multiple answers allowed. (n = 16).



19. Is complying with emission regulations a substantial cost to your business?
☐ Yes ☐ No If so, how?

Yes	22
No	13
	n = 35

Figure 4-10. Costs of complying with emission regulations. (n = 21).



Although only half of respondents to question 18 thought that regulation had a significant impact on their businesses, 64 percent feel that complying with emission regulations represents a substantial cost to their businesses. The forms that the cost of complying takes are shown in Figure 4-10. Half of the respondents cite the increased cost of required equipment and coatings, thirty percent cite the cost of permits and reporting, and fourteen percent list a reduction in the quality and quantity of product that can be produced with coatings required by regulation.

20. Is disposal of coating related waste (e.g., rags and waste coatings) a substantial cost to your business? ☐ Yes ☐ No

Yes	15
No	18
	n = 33

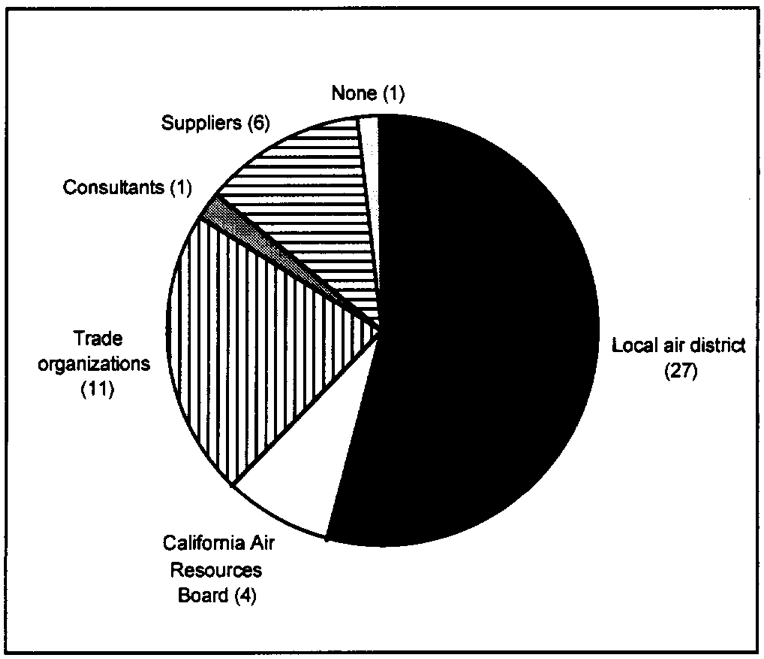
21. Do you anticipate new, more restrictive emission regulations in the next few years? ☐ Yes ☐ No

Yes	24
No	10
	n = 34

22. What is your principal source of information about air pollution regulations?

- ☐ **Local air quality control district**
- ☐ **California Air Resources Board**
- ☐ **Trade organization publications or meetings**
- ☐ **California Air Resources Board**
- ☐ **Other, please describe**

Figure 4-11. Principal sources of information about air pollution regulations. Multiple responses allowed. (n = 36).



Two out of three firms surveyed indicate that they feel they will face more restrictive emission regulations in the next few years. As shown in Figure 4-11, a majority of firms get information about air pollution regulations from their local districts, but many also get information from suppliers and trade organizations.

23. **Please share with us any general comments or issues that you feel are important in the purchase, application or regulation of wood furniture and fixture coatings:**

Comment 1:

As a small business owner I am concerned about the effort to force businesses to use products that do NOT produce a satisfactory finish. I have tried several brands and even had factory representatives try to produce a finish acceptable to our customers, NOT IN THEIR LAB, but in our shop. So far they have been unable to do so. I am also concerned that so much effort (EPA, BAAQMD, SMCHS, CARB) is spent trying to reduce VOCs from an industry that produces less than 1% of the VOCs exhausted into the atmosphere. The technology needs to be found first, and then slowly phased into production to avoid causing business closures or merely moving to a place where things are not as restrictive.

Comment 2:

I have to take objection to the survey you have presented.

A. The business community is over burdened with surveys, forms, fees, permits, etc. Your particular survey, to be accurate, would entail countless hours and most of the information is submitted in our annual Emissions Summary Report to the South Coast Air Quality Management District.

B. If the information submitted to the AQMD is not gathered in a fashion acceptable to your requirements, get with the AQMD so that next year you receive all you want.

C. The AQMD spends lots of dollars every year on surveys. Read them, even though most are statistically not reliable; they might give you the insight you desire.

D. Many of the questions are absurd; i.e., #21. Of course we can expect more regulations; regulations are what all you people seem to desire.

E. Get off the water base band wagon - if you think water base is your answer to the world's problem. Find some incentive to the manufacturer to use water.

I actually believe the amount of time put into questions and research is becoming ridiculous. **"NO ONE READS THIS _________!"**

5
Industry Structure and Coating Use

5.1 Geography of Coating Use

Wood furniture is manufactured throughout the United States, but activity is concentrated in North and South Carolina, Michigan, and California. Wood furniture coating formulations and coating processes vary by region, primarily because of differences in environmental regulation. Coating manufacturers will formulate their products to be sold in North Carolina specifically to meet that state's Rule 66. Similarly, coatings to be sold in California will be formulated to meet the rules of various California's Air Quality Management Districts. Manufacturers will also formulate coatings specifically to meet the needs of their larger customers and may deliver such coatings in tanker trucks directly to a customer's facility. Thus, the formulations of coatings used in the wood furniture industry vary significantly because of regional differences in environmental regulation and local customer needs.

As mentioned previously, this source category includes the manufacture of many diverse products. The diversity of products and associated diversity of finish requirements introduces additional variation into wood furniture coating formulations and application practices.

Firms manufacturing furniture in California range from one-person home businesses to multi-national firms employing hundreds of workers at a single facility. Furniture manufacturers are not the only firms coating wood furniture. A significant amount of furniture is sold unfinished and is subsequently finished by wholesalers, retail consumers, or building and finishing contractors. For example, many kitchen cabinets are sold unfinished and are finished by the building contractors that will install them in new homes or remodeled kitchens. In California, a large amount of wood furniture also is finished by finishing contractors outside of the furniture manufacturing facility.

5.2 Unfinished Furniture and External Coating Contractors

As described in Chapter 4, this study involved a written survey of wood furniture manufacturers that was performed in two mailings. The survey form used in the first mailing did not allow the respondent firm to indicate that their furniture was sold unfinished or finished by an independent firm. Because the survey form did not allow such firms to easily explain how their product was finished, they may have been less likely to return the survey or to simply indicate that the survey did not apply to them. Despite this bias against response by firms that do not finish their products, of 289 surveys returned from the first mailing, 6.8 percent of the respondents wrote-in that they utilize finishing contractors (See Table 5-1). Similarly, 7.9 percent indicated that they sell their furniture unfinished. (An additional 32 firms that were contacted by telephone during follow-up indicated that the survey did not apply to them, but the reason given was not recorded.)

In the second mailing, the survey form specifically asked if the respondent firm used a contract finisher or sold unfinished furniture. This smaller sample may be slightly biased toward a larger response rate in the "no finishing" category since if no finishing is performed, the respondent needed spend very little time filling-out the survey form, while those firms that perform their own finishing were required to answer eleven questions. In this sample of 64 surveys returned, 28.3 percent use a contract finisher and 28.3 percent sell their furniture unfinished. Although uncertain, it appears that between 10 and 25 percent of firms in this source category use the services of outside finishers, and an additional 10 to 25 percent sell their product unfinished. Thus, it is likely that between 20 and 50 percent of firms that manufacture wood furniture perform no finishing.

Table 5-1. Numbers of wood furniture manufacturers that perform no finishing.

Type of response	Mailing #1 (n=289)	Percent	Mailing #2 (n=64)	Percent	Total	Percent of total
Utilize finishing contractor	20	6.9	18	28.1	38	10.8
Sell furniture unfinished	23	8.0	18	28.1	41	11.6
Survey not applicable, but no reason given	32	11.1	--	--	--	--
				Total	79	22.4

In a telephone survey performed during this study of twelve furniture manufacturers that use finishing contractors, both large and small firms found finishers attractive. Small wood manufacturers that use finishing contractors indicated that they prefer to send their furniture out to finishing shops because they cannot control the quality of coating in their small, dusty workshops, and the cost of maintaining spray booths and employing skilled applicators was prohibitive for their small production rates. Larger manufacturers reported that they contracted with finishing shops due to the cost of meeting air pollution and health and safety regulations. Having finishing firms do their wood furniture coating allows these firms to focus on their main business of making furniture. Finishing firms can, presumably, be more cost effective by spreading the cost of coating operations and regulation over a much larger amount of finishing work. Several furniture manufacturers indicated that they contracted with several small finishing operations, and doubted whether these finishers were properly licensed or were meeting emission or health and safety regulations.

The extensive use of finishing shops for furniture coating and the finishing of cabinets by installers complicates the estimation of wood coating emissions because it reduces the data available and increases the uncertainty in what and how coatings are applied. This subject is discussed further in Chapter 8.

5.3 Potential Impacts of Regulation

The wood manufacturing industry in California is regulated by federal, state, and local Air Quality Management District (AQMD) emission rules. In the more industrialized AQMDs of California, the local district rules are the most strict, and are therefore the driving force behind regulatory driven changes in the industry. The intended impacts of the air district rules on VOC emissions are explicit in the rules' wording. The impacts of federal regulations on industry practice and emissions is less clear.

The national emission standards for hazardous air pollutants (NESHAP) process may have significant impacts on future VOC emissions in the wood furniture and fixture coating category. The HAP rules directly and indirectly encourage the use of low VOC coatings. The proposed "work practice standards" include the elimination of the use of air spray guns in coating application except under special circumstances; one of which is the use of coatings that emit less than 1.0 kg VOC per kg solids. For many manufacturers, using low VOC coatings that allow them to retain their investment in application equipment will be the preferred way to meet this standard.

The formulation assessment plan (FAP) portion of the work practice standards also encourages the use of low-VOC coatings. Under the proposed standard a facility would be allowed to exceed baseline usage of VHAP if the increase resulted from "the adoption of low VOC coatings, that is, coatings with a VOC content of no more than 1.0 lb VOC/lb solids, as applied (the potential increase in HAP being deemed acceptable because it is offset by a decrease in VOC)."

Other ways that the proposed HAP emission rules may reduce VOC emissions are through requirements for HAP emission control devices (which would likely reduce VOC emissions also) and standards for wash-off and cleaning operations that minimize solvent evaporation and require that a log of the quantity and type of solvents used be maintained.

On 12 July, 1995, the EPA removed acetone from its list of VOCs because, due to its low reactivity, it is not considered to be ozone producing in urban environments nor is it ozone reducing in the upper atmosphere. The exemption of acetone allows it to replace 1,1,1-trichloroethane (TCA) as a solvent in wood coating formulations. (TCA is not a significant photochemical smog precursor, but depletes stratospheric ozone.) Acetone has now been exempted by the CARB and most of the AQMDs in California. The exemption of acetone may trigger large-scale reformulation of the wood coatings used in California. This would have a significant impact on emission estimates based on existing coating formulations. Our report includes acetone in our VOC emission estimates, since the MSDS's used for this study included acetone in their VOC estimates.

The applicability of acetone as a solvent in wood coatings in California is a matter of debate within the wood coating industry. A brief telephone survey of major wood coating manufacturers performed as part of this study yielded conflicting results. A representative of one coating manufacturer indicated that acetone will not be a help to them in their big market of the SCAQMD. Using acetone to make a workable coating still has too much VOC for Rule 1136. This representative believed that acetone would not find wide use in wood furniture coatings in California. Conversations with non-technical representatives of two other coating manufacturers seemed to contradict the views of this representative, feeling that acetone could become widely used in wood coatings in

California, although they did not feel technically qualified to be certain and did not want to make any official statements for their firms.

Frequent and substantial changes in federal and state regulations applying to wood furniture and fixture manufacturing will likely result in rapid and continuous change in the formulation of wood furniture coatings used in California. Changes in coating formulation will make obsolete the emission factors developed in this study, and thereby increase emission estimate uncertainty (which is not reflected in emission factor uncertainty estimates). Emission factors must be updated to account for changes in coating formulation. Unfortunately, there is no easy way to update the emission factor portion of the estimation methodology. One possible way to update emission factors would be to take regulated VOC content limits as upper bounds on VOC content. Assuming that district regulated VOC content represents actual practice would not reflect coating formulation in regions not covered by regulation. Because coating formulation is not well correlated with any independent variables that can be easily measured, as coating formulations change emission factors will have to be updated through a survey of manufacturers or applicators.

5.4 Summary

The broad range of coatings and application processes in this source category produces great variation in usage rates and coating emission factors, complicating the process of estimating emissions. The widespread use of finishing contractors and sales of unfinished furniture makes it more difficult to link emission rates and furniture manufacturing rates because there are no good data on emissions from finishing contractors. The volatile regulatory environment that controls practices in the wood furniture industry in California also complicates the estimation of emissions by stimulating rapid changes in coating formulations and application processes. The estimation methodology that has been developed, as described in Chapter 6, where possible, takes these complicating factors into account and otherwise minimizes their impact on estimate accuracy.

6

Emission Inventory Estimation and Update Method

6.1 Overview of Inventory Methods

The emission estimation methodology is based on the idea that furniture manufacturing firms and wood furniture coatings can be divided in small groups of similar firms, and through the survey process, standard profiles of the characteristics of these groups can be developed. Given that valid statistical profiles can be formed, the emission estimate is computed by multiplying three terms: the number of firms in a size and SIC category as measured by the U.S. Department of Commerce; an estimate of coating usage by firms in that firm category; and estimates of emissions factors for each coating category. This type of estimator has the advantage that it uses a relatively small amount of information and is flexible enough that it can be used to explore how changes in coating use and formulation rules will affect emissions.

If coating formulations have not changed appreciably since emission factors were estimated, updating this type of emission estimate is simply a matter of updating the business activity data in the estimator with the latest census figures. As regulation and technological advancement induce changes in the formulations of wood furniture coatings, the coating emission factors will also have to be updated.

Even though this type of emission estimator is conceptually simple, there are many different ways it can be formulated. Calculating the estimate uncertainty, in particular, involves many choices which affect the flexibility and accuracy of the procedure. In this chapter, the formulation of the emission estimator is described and the trade-offs inherent in this formulation are discussed. In this chapter categorization of furniture manufacturing firms is described, then computation of the emission estimate and associated estimate uncertainty are defined. The categorization of furniture and fixture coatings is described in Chapter 3, and the development of the coating emission factors is presented in Chapter 7.

6.2 Firm Categorization

The objective in categorizing furniture and fixture manufacturing firms for the estimation process is to form groups of firms that use similar types and quantities of wood coatings. There is a trade-off in choosing firm categories that is analogous to that described in Chapter 3 with regard to choosing coating categories. A large number of categories reduces the variance between firms within a category, but increases uncertainty in the category profile because there will be less survey data available that applies to the category. Thus the number of firm categories must be chosen to balance these two sources of uncertainty.

In census data, firms are divided into categories by SIC code and number of employees. The number of firms in any county, categorized by SIC code and firm size, is available on an annual basis through the County Business Patterns report prepared as part of the U.S. Census (Census 1993). The majority of wood furniture and fixture manufacturing activity is described by seven different four-digit SIC (defined in Section

2.1). In census data firms are divided within an SIC code by size such that there are seven categories between one and five hundred employees. Thus, if the standard census categorization were used, there would be forty-nine categories of wood furniture firms with less than five hundred employees.

Although seventy firm categories does not seem so very many, consider that according to census data there are approximately 1500 wood furniture firms in California. If **every** firm in California was successfully surveyed, with 49 categories, there would be only 30 firms per category, on average. Since survey response rates of 15% to 20% are more common, there would more likely be on average, only 5 to 6 responding firms per category. There would certainly be many categories that would not be represented at all in the survey response. This choice of categories would increase estimate uncertainty unnecessarily by dividing the sampled data too finely.

To reduce the number of categories, SIC codes were grouped according to the type of product produced. The resulting four firm categories are defined in Table 6-1.

Table 6-1. Firm categories by SIC.

Firm Category	SICs included
Cabinets	2434 - Wood kitchen cabinets
	2517 - Wood TV and radio cabinets
Upholstered Furniture	2512 - Upholstered household furniture
Furniture	2511 - Wood household furniture
	2521 - Wood office furniture
Not-elsewhere-classified	2541 - Wood partitions and fixtures
	2599 - Furniture and fixtures, n.e.c.

The use of four firm categories was expected to result in, on average, only 10 firms per category, assuming a 20% response rate from 1500 firms. However, further aggregation of firms by product was not judged to be practical because the industrial practices of the firms in the four categories are often quite different, and further aggregation would increase overall estimation uncertainty.

As discussed in Chapter 2, there are only a few very large furniture manufacturers in these SIC groups, so there are categories that will likely have only one or two firms in the entire population (and correspondingly, other categories will contain many more than the average number of firms). The larger firms generally will report their emissions directly because they will be permitted point sources and thus could be removed from this area source estimation procedure. Since the categories of larger firms will be poorly represented in the survey sample, they will contribute a large part of the estimate uncertainty, and their elimination would improve estimation accuracy substantially. Emissions from these large sources could be estimated from permit data and added back into the area emissions to estimate total emissions. To provide consistency of reported permit data, this issue should be considered further by CAPCOA. However, all size categories are included in the estimation procedure developed and applied in this report, except as noted.

6.2.1 Disaggregating Census Data

Firms classified under SIC 2599, "Furniture and fixtures, not-elsewhere-classified" will include many that do not manufacture any wood furniture. This category includes a wide variety of firms that manufacture metal, glass, and plastic furniture, and items such as "bean-bag" chairs, mirrors, and picture frames. Including these firms in the data for number of wood furniture firms would bias the emission estimate, and so the number of firms within the 2599 SIC must be disaggregated into those that do, and do not, manufacture wood furniture.

The data needed to disaggregate this category are available from the applicator survey. Many firms from SIC 2599 were surveyed and responded as to whether they manufactured wood furniture or not. The survey data indicate that 23.1 percent of firms within SIC 2599 manufacture wood furniture. That is, the probability that a firm randomly selected from the population of SIC 2599 firms manufactures wood furniture is 0.231.

Assuming that whether or not a firm in a size category of SIC 2599 manufactures wood furniture is random and independent, then the total number of firms in that size category that manufacture wood furniture has a binomial distribution. The probability that the number of such firms, Y, is less than some number M, is given by

$$P(Y \leq M) = \sum_{k=0}^{M} \binom{n}{k} p^k (1-p)^{n-k} \tag{6.1}$$

where n is the total number of firms in the SIC 2599 size category, and p is the probability that any firm in SIC 2599 manufactures wood furniture (= 0.231). For any desired confidence level, this equation can be solved in reverse to determine the maximum number of firms within a size category that manufacture wood furniture.

For example, the 1993 County Business Pattern data for Los Angeles County indicate that there were 26 firms in SIC 2599 with between 1 and 4 employees. Using a 90% confidence level, solving Equation 6.1 backward we find that 10 or fewer firms in this category are expected to manufacture wood furniture. Thus using the figure of 10 firms gives a known confidence level and a conservative estimate. (Simple application of the 23.1% proportion would have indicated that 6 firms manufacture wood furniture.)

6.3 Firm Coating Usage - Activity Estimation

The type and amount of coatings that firms in a given firm category can be expected to use, that is, a "coating use activity profile", is determined from the data gathered through the applicator survey. The coating usage data from the survey of wood furniture manufacturing firms were grouped according by firm category and average usage in each coating category computed. For the purposes of emission estimation, the coating use averages are taken to be representative of usage by individual firms in the firm categories.

Only some of the air districts in California have rules that apply to wood furniture coatings and coating application. Coating usage in those districts that have rules is expected to reflect the constraints of the local rules (usually coating VOC content limits). Thus, firm coating usage will vary by district, whereas the estimation method developed here is based on statewide average use patterns. We have attempted to gather information from firms in districts throughout the state so that such an average will be representative. Districts with larger numbers of firms in the wood furniture industry should be more highly represented in our random sample. Thus average usage by firm category should produce an accurate statewide estimate, but may bias estimates for individual districts if local rules and/or usage vary significantly from the average.

For reasons discussed in Chapter 4, the number of firms that replied to the applicator survey was small. The impact of a small sample size is increased emission estimate uncertainty. In this study great effort was made to gather as much data as possible, including reminder letters and re-survey using a shorter survey and a more forceful request for response. Despite these efforts, the number of useful responses was still relatively small. One additional way to increase the sample size is to include data from other sources. One such source that is compatible with the estimation methodology is a survey performed by the Sacramento Metro Air Quality Management District (SMAQMD) during 1994.

The SMAQMD survey included usable results from 40 applicators. The only required data not gathered in the SMAQMD survey process was firm size. Each firm included in the SMAQMD survey data was contacted by telephone to determine firm size. These data were then included in the coating usage database. The disadvantage of using these data is that they are all from one district and therefore may bias the statewide sample toward the usage of the Sacramento Metropolitan district. However, without these data the Sacramento region is statistically underrepresented in our sample, because firms in this area, having just been through a local survey process, were largely unwilling to respond to our survey. In addition, since the usage in Sacramento does not appear to be significantly different from that of the other districts, risk of regional bias is compensated by the improved estimation accuracy achieved through increasing the sample size.

6.3.1 Coating Usage Uncertainty

Coating usage uncertainty is estimated by assuming that coating usage data are normally distributed within each category, and truncated at zero usage. If normally distributed, the uncertainty of the average coating usage can be estimated using a t distribution. Use of the t distribution, requires that the *level of significance* of the statistical test be specified (e.g., the probability that the mean is within the uncertainty bounds is 90%). With the level of significance specified, the uncertainty bounds can be generated directly from the t distribution. The *level of significance* has a direct influence on the size of the uncertainty bounds. If a lower level of significance is acceptable, the uncertainty bounds will be narrower.

The assumption that coating usage is normally distributed is not immediately obvious. Clearly, coating usage cannot be a negative number, as would be possible if coating usage were normally distributed. Other distributions, such as the log-normal, are non-negative, but have other shortcomings. (The log-normal distribution, though non-negative, has a very long positive tail.)

The truncated normal distribution is justified because it is the "maximum entropy" distribution for cases when the available information is the expected value and the variance of a variable that can take on values between some minimum and maximum values (Tribus 1969). The maximum entropy distribution is the statistical distribution form that maximizes use of the available information. Thus, because the information about coating usage that is available from the survey process is the mean and variance, and coating usage cannot be negative, the best statistical distribution to describe the data is the truncated normal.

Dividing coatings into "low-VOC" and "high-VOC" categories reduces the variation in coating VOC content, but it increases the variance in coating usage estimates. Usage of coatings categorized by application naturally exhibits large variation because in any coating category (e.g., solvent-based stain) a number of firms will use none while others will use a great deal. For example, a firm that uses large amounts of low-VOC stain is not likely to use significant amounts of high-VOC stain, and vice-versa. Therefore, the data will naturally exhibit large variation in usage, particularly among the large firms. This characteristic is inevitable and properly reflects coating usage.

6.4 Computation of Emission Estimates

As described above, emission estimates are calculated by multiplying three terms: the number of firms in a size and SIC category as measured by the U.S. Department of Commerce; an estimate of coating usage by firms in that firm category; and estimates of emissions factors for each coating category. In this study these calculations are performed using Microsoft EXCEL® spreadsheets. Development of the emission factors is described in Chapter 7. In this section the organization of the emission estimator spreadsheets is described.

The emission estimation calculations are contained in two spreadsheet workbooks. The first, labeled "USAGE", contains the firm activity estimates and the emission factor estimates. The second, labeled "ESTIMATOR", contains the census data and emission estimates. The ESTIMATOR workbook is used to perform the actual emission estimate calculations. The estimator computes emissions for one county at a time. The county is specified by the user as an input.

The USAGE workbook contains two spreadsheets: "Firm Usage" and "Emission Factors". These sheets contain the survey data organized by firm and coating category. The computed mean usage and mean emission factors are stored in named arrays. For example, the mean usage of all coatings by firms in the Cabinet Firms, with 1 to 4 four employee size category are stored in one array named "CAM". The use of array names and calculations allows the emission estimate formulas to address entire categories at once, and simplifies the spreadsheet organization. For example, the emissions in each coating category from cabinet firms with 1 to 4 employees is the result of one array equation in which the number of such firms in the county is multiplied by the arrays of mean coating usage (CAM) and emission factors (EFALL).

The ESTIMATOR workbook contains five modules: "Module 1" contains various visual basic utilities written to automate estimation tasks; "CBP 1993" contains 1993 County Business Pattern census data; "Census Data" contains the extracted census data for the county to be analyzed; "Emissions Estimate" contains un-reduced emission estimate results; and "Output" contains the reduced and summarized emission estimate output.

To compute the emission estimate for a given county, the user selects the county from a list on the "Census Data" sheet and the outputs appear on the "Output" sheet. Outputs include mean emissions and uncertainty bounds for each firm and coating category, as well as totals for SIC groups, coating categories, and total emissions for the county.

6.5 Propagation of Estimation Uncertainty

An important part of any estimation process is evaluation of the uncertainty associated with the estimate. The uncertainty associated with estimates of air pollution emissions should be taken into consideration in the use of these estimates for regional air quality management studies and actions.

There are a great many uncertainties in emissions estimation. In this study, the uncertainty measure that is calculated and reported is the standard 90 percent confidence interval for the mean of the output being reported. This measure reflects the uncertainty contained in the probability density function for the uncertain output. In this case, that uncertainty reflects only the variability of the coating use and emission factor sample data. There are a great many other sources of uncertainty that are not quantified, some of which are discussed in this report. A few of the unquantified sources of uncertainty are: sampling errors such as bias in survey responses, errors in correctly identifying the size, location and product type of responding firms; errors due to small sample sizes; and error in assuming that the probability density functions of coating usage and emission factors can be taken to have a truncated normal form.

In this report, calculation of the uncertainty associated with the individual components of this estimation process (i.e., the emission factors and coating usage estimates) is described where the component computations are presented. When these components are combined in forming the emission estimate, these component uncertainties must also be combined to produce an estimate of intermediate and final emission estimates. Uncertainty is propagated through the estimation process by application of the error propagation equation. In this section the error propagation equation is derived and its use demonstrated.

The general form of an estimator of the value of a variable x which is a function of two (or more) measured variables, u and v is given by

$$\bar{x} = f(\bar{u}, \bar{v}, \ldots) \tag{6.2}$$

The uncertainty of the resulting value of x can be approximated though a Taylor series expansion as

$$\sigma_x^2 \cong \sigma_u^2\left(\frac{\partial x}{\partial u}\right)^2 + \sigma_v^2\left(\frac{\partial x}{\partial v}\right)^2 + \cdots + 2\sigma_{uv}^2\left(\frac{\partial x}{\partial u}\right)\left(\frac{\partial x}{\partial v}\right) + \cdots \tag{6.3}$$

Where σ_x^2 is the variance of x, and σ_{uv}^2 is the covariance between the variables u and v. Equation (6.3) is known as the *error propagation equation* (Bevington 1992).

The first two terms in Equation (6.3) are averages of squares of deviations weighted by the squares of the partial derivatives, and may be thought of as the averages of the squares of the deviations in x produced by the uncertainties in u and in v, respectively. In general, these terms dominate the uncertainties. If there are additional variables besides u and v in the function determining x, their contributions to the variance of x will have similar terms.

The third term in Equation (6.3) is the average of the cross terms involving products of deviations in u and v weighted by the product of the partial derivatives. If the variation in the measured quantities of u and v are uncorrelated, then on average, we expect to find equal distributions of positive and negative values for this term, and the term should vanish in the limit of a large number of random observations. In this study, this expectation is realized since the fluctuations in observations of coating usage and coating VOC content are uncorrelated. In this case, Equation (6.3) reduces to

$$\sigma_x^2 \cong \sigma_u^2\left(\frac{\partial x}{\partial u}\right)^2 + \sigma_v^2\left(\frac{\partial x}{\partial v}\right)^2 + \cdots \tag{6.4}$$

with similar terms for additional variables. It is this form of the error equation that is used in this study to propagate the uncertainties. For example, when the emission estimate is formed as the product of the (deterministic) number of firms, the firm coating usage, and the coating emission factors, we have the product of three terms, one deterministic and two stochastic. This calculation can be represented as

$$x = auv \tag{6.5}$$

The partial derivatives of each variable are functions of the other variable,

$$\left(\frac{\partial x}{\partial u}\right) = av \qquad \left(\frac{\partial x}{\partial v}\right) = au \tag{6.6}$$

and the standard deviation of x becomes

$$\sigma_x = (av\sigma_u) + (au\sigma_v) + 2auv\sigma_{uv} \tag{6.7}$$

which can be expressed more symmetrically as

$$\frac{\sigma_x^2}{x^2} = \frac{\sigma_u^2}{u^2} + \frac{\sigma_v^2}{v^2} + 2\frac{\sigma_{uv}^2}{uv} \tag{6.8}$$

Assuming that the covariance terms are zero, the variance is

$$\sigma_x^2 = x^2\left(\frac{\sigma_u^2}{u^2}+\frac{\sigma_v^2}{v^2}\right) \tag{6.9}$$

Equation (6.9) is used to propagate uncertainty from the components of the emission estimate into the product. Similarly, by simple application of Equation (6.4), the variance of the sum of uncertain variables can be shown to be sum of the squares of the component standard deviations. Therefore, the uncertainty of the emission estimates computed as the sum of emissions by category can be computed as the square root of the sum of the squares of the component estimate uncertainties.

There is uncertainty associated with all data, but not all uncertainty can be quantified. The County Business Pattern data that provides the number of firms in each firm category has no associated uncertainty estimate. Census officials and documents acknowledge that there is uncertainty in these data, but cannot estimate its magnitude. During the course of this investigation we have heard of wood furniture manufacturing and coating firms that operate without business licenses or permits. Such firms would not appear in census business pattern data. Census data may also not include firms that list as their primary SIC some category other than those we have included, but may still coat wood furniture. For example, several prisons manufacture and coat furniture, yet would probably not appear in census data under any of the logical SIC categories. Addressing these sources of error are beyond the scope of this study. Because the vast majority of emissions are expected to be from firms that are included in census data, the error in the emission estimates (and uncertainty estimates) introduced by firms not captured in census data is expected to be small compared to the overall level of emissions.

6.6 Update method

Updating the emission estimate to reflect conditions at some future time is a matter of updating the three types of data that make up the estimate: the number of firms in a size and SIC category; the estimate of coating usage by firms in the firm categories; and estimates of emissions factors for each coating category. The number of firms can be updated annually from census data. Coating usage should not change significantly in the short term, although new regulations may shift some usage from high- to low-VOC formulations. Coating emission factors however, will probably change significantly in the near future because of the phasing-in of existing regulation and promulgation of new regulation. There is no practical and statistically sound way to update the emission factors other than to re-survey wood furniture coating users, or to convince coating manufacturers to reveal sales and emission factor data. Therefore, the method of updating the emission estimate is to: 1) update the firm numbers annually using census data, 2) monitor the change in coating emission factors (perhaps through activity and emissions reported by permitted sources), and 3) then update emission factors and coating usage through a survey process when necessary.

The process of updating the number of furniture and fixture firms has been partially automated through EXCEL macros that are stored in the "Module 1" module of the ESTIMATOR workbook. The first step in the firm number update procedure is to retrieve the census data. The number of firms in any county, categorized by SIC code and firm size, is available on an annual basis through the County Business Patterns report prepared as part of the U.S. Census (Census 1993). These data are available in both paper and CD ROM format. In this study, data were retrieved from CD-ROM using the data management program resident on the census CD entitled EXTRACT. Through a simple menu process the EXTRACT program allows the user to extract only the firm size data for the selected SICs and for all counties to a text file readable by most spreadsheets.

Data are read into the EXCEL spreadsheet "CBP 1993". If a county contains no firms in one of the SICs selected, the County Business Pattern data will have no entry for that county/SIC combination. The estimation procedure requires that the database contain zero values in these data locations, and so the census firm data must be reformatted slightly. An EXCEL macro called "Fillin" has been written to search through County Business Pattern data and fill in any missing SIC data with zeros. The County Business Pattern data as extracted by the EXTRACT program should be organized by county with the firm size category data in columns across the spreadsheet and the County/SIC groups in rows. The "Fillin" macro will check that the SIC codes appear in the expected numerical sequence. If an SIC is missing, "Fillin" will add it with corresponding zero values in the firm number categories across the spreadsheet. To run "Fillin" the user selects from the SIC column to the right across all rows and all columns and then executes the "Fillin" macro.

When the zero value firm number data have been added, the census data are sorted by SIC. The result is a block of data organized by SIC with the firm size category data in columns across the spreadsheet and SIC/County groups in rows with an entry in the SIC groups for each county (see current data in "CBP 1993" for example).

The final step in the update process is to label each block of SIC data so that it can be located by the emission estimation code. This is done by using the EXCEL cell naming ability. The naming convention currently used is "SIC" followed by the SIC number, such that the block of data including all firm number data in SIC 2511 and associated county codes would be "SIC2511".

6.7 Summary

The "bottom-up" estimation methodology described in this chapter is conceptually simple and easy to apply, and allows uncertainty in emissions estimates to be quantified. Because the "estimate and update" method uses independent business activity data from the U.S. Census, it automatically incorporates changes in business cycles, industry shifts, and the movement of firms. The method should not be affected by changes in coating usage because the amount of coating needed to finish a given type of furniture will remain relatively constant unless use of highly efficient application equipment becomes widespread. The factors to which the estimation methodology is most sensitive are emission factors (discussed in Chapter 7) and the availability of survey data. Although sensitivity to emission factor accuracy has been reduced by dividing each category into "high-VOC" and "low-VOC" subcategories, as coatings are reformulated, the emission factors will need to be updated. The most critical factor in this (or any) estimation method is the availability of a sufficient quantity of accurate data. The validity of this method relies on the fact that enough accurate coating usage data can be collected from firms so that representative usage profiles can be developed.

7
Emission Factor Development

7.1 Introduction

Emission factors are estimates of the amount of pollutant emitted from the use of a given quantity of coating. In this study, emission factors represent the volatile organic compounds (VOC) resulting from evaporation of organic solvents in coatings used during wood furniture finishing (application and curing). Emission factors are calculated for each coating category (coating categorization is described in Chapter 3), and for all wood furniture coatings as a group. The coating category emission factors are combined with coating usage to form estimates of VOC emissions by coating and firm category during the "bottom-up" estimation process described in Chapter 6. The emission factor for the group of all wood furniture coatings is combined with total wood coating usage in California to estimate total VOC emissions during the "top-down" estimation process, as described in Chapter 9.

7.2 Emission Factor Development

Emission factors are calculated for each coating category as an average of coating VOC content weighted by coating usage. In this way, more widely used coatings in a category have relatively larger influence on the predicted average emissions factor for that category. The usage rates used to form the weightings are those reported by furniture manufacturers in the applicators' survey.

Emission factor uncertainty is estimated in the same way that uncertainty was estimated for coating usage. It is assumed that VOC content of the coatings is distributed normally within each firm category, and truncated at zero. If normally distributed, the uncertainty of the average emission content can be estimated directly from the *t* distribution.

Emission factor estimates and variability for each coating category are presented in Table 7-1. In Table 7-2, emission factors are compared with those generated by the Sacramento Metropolitan Air Quality District (SMAQMD) for a slightly different set of coating categories. The SMAQMD emission factors were generated in an ad hoc manner from a sample of Material Safety Data Sheets (MSDSs) acquired by district personnel. The SMAQMD does not currently have specific wood coating rules, so wood coating VOC content might be expected to be higher than the California state average. The most noticeable difference between these sets of emission factors are in the low-VOC coatings. The SMAQMD emission factors for water-based coatings is uniformly 3.0 lb/gal., a conservative estimate.

Table 7-1. VOC Emission factor estimates and corresponding variability.

	Emission Factors			
	High-VOC		Low-VOC	
Coating Category	Weighted Average (lbs/gal)	95% Confidence Bounds	Weighted Average (lbs/gal)	95% Confidence Bounds
Topcoat	5.40	± 0.22	1.39	± 0.32
Filler	3.06	± 2.32	1.55	± 1.04
Stains	5.53	± 0.26	0.71	± 0.41
Colored	5.35	± 0.55	0.23	± 0.72
Sealer	5.60	± 0.15	1.68	± 0.41
Washcoat	5.08	± 0.64	1.63	± 1.80
Enamel	4.50	± 1.18	1.72	± 1.01
Other	4.51	± 0.43	0.57	± 1.84
Solvent	6.57	± 0.18	N/A	N/A

Emission factors are presented in terms of pounds of VOC per pounds of solids in Table 7-1a. Emission factors in Table 7-1a were converted from pounds of VOC per gallon to pounds per pound of solids (the second column of Table 7-1a) based on standard density assumptions (880 g/l for solvent and 1200 g/l for solids). This "theoretical" VOC content was then multiplied by a correction factor (the third column) to yield the corrected emission factor (the fourth column). (Rounding is used to maintain the appropriate number of significant figures in the fourth column.) This conversion process and the correction factors were developed by the South Coast Air Quality Management District (SCAQMD 1996c). The SCAQMD computed the correction factors from actual and theoretical VOC's based on MSDS's supplied by coating formulators for several coating categories.

Table 7-1a. VOC Emission factor conversion to lb/lb

Coating Category	Emission Factor Based on Standard Densities (lb/lb)	Correction Factor	Corrected Emission Factor (lb/lb) (rounded)
High-VOC:			
Topcoat	2.04	1.16	2.37
Filler	0.52	0.68	0.36
Stains	2.24	1.01	2.25
Colored	1.97	0.89	1.75
Sealer	2.36	1.25	2.94
Washcoat	1.65	1.00	1.65
Enamel	1.16	1.00	1.16
Other	1.17	1.00	1.17
Low-VOC:			
Topcoat	0.17	1.06	0.18
Filler	0.20	0.56	0.11
Stains	0.08	0.87	0.07
Colored	0.02	0.77	0.02
Sealer	0.22	1.10	0.24
Washcoat	0.21	1.00	0.21
Enamel	0.22	1.00	0.22
Other	0.06	1.00	0.06

An emission factor that represents average emissions for all wood furniture and fixture coatings is needed in the "top-down" emission estimation methodology which is based on total consumption of wood furniture coatings. The emission factor for all wood furniture coatings was calculated as a weighted average of all coating VOC content data. That is, the "all category" emission factor is computed in the same manner as those for individual categories, but all coatings are grouped in one large category. The single wood furniture emission factor was estimated to be 3.97 lb/gal. The ARB has as recently as 1985 used an emission factor for this category emission source (CES) of 3.21 lb/gal. This emission factor was computed from a 1977 survey of coating applicators performed by the Stationary Source Division, ARB (ARB 1977).

Table 7-2. Comparison of estimated VOC emission factors and those used by the SMAQMD.

SMAQMD Emission Factors (lb/gal.)			Emission Factor Means (lb/gal.)		
Coating Category	Solvent-based	Water-based	Coating Category	High-VOC	Low-VOC
Clear Topcoat	5.8	3.0	Topcoat	5.4	1.39
Filler	4.2	3.0	Filler	3.06	1.55
High solid stain	6.7	3.0	Stains	5.53	0.71
Low solid stain	6.7	3.0			
Mold seal	6.3	3.0			
Multi-colored	5.7	3.0	Colored	5.35	0.23
Pigmented	5.8	3.0			
Sealer	5.7	3.0	Sealer	5.60	1.68
Washcoat	6.2	3.0	Washcoat	5.08	1.63
Toner	6.2	3.0			
Varnish	4.3	3.0			
			Enamel	4.50	1.72
			Other	4.51	0.57

8

1993 Wood Furniture Coating Emission Inventory

8.1 Introduction

This chapter presents a summary results of the estimate of emissions from wood furniture and fixture coating operations in California during 1993. This estimate is the result of application of the estimation procedure described in Chapter 6 using the 1993 County Business Pattern firm number data and the emission factors described in Chapter 7. This chapter also contains details of how the estimation was performed and a comparison of results with emission estimates made by some of the local air districts for the same period.

8.2 Estimating Emissions of Large Firms

As described in several places in this report, coating firm categories are chosen such that a balance is struck between variation in coating operations within the firm categories and the sample size in each category. The advantage of dividing furniture manufacturing firms into groups that have similar business practices is that reduced variation within the groups will reduce overall estimation uncertainty. The disadvantage is that smaller sample size tends to increase the estimate uncertainty. Where the latter effect is most pronounced is in the large firm categories. Typically, there are very few large firms so the uncertainty of a statistical emission estimate in these categories is naturally high, and division of the small sample into smaller groups only increases uncertainty. Because the categories of large firms have high emission rates and high uncertainty, a large portion of the overall emission estimate uncertainty results from these emission category estimates, even though they do not represent nearly as large a fraction of total emissions.

One way to reduce the uncertainty introduced by large firms is to remove them from the area emission estimate procedure. As described in Chapter 4, the large firms are typically permitted sources and as such are required to report their emissions individually. Therefore, these emissions could be added to area emission estimates to obtain total emission estimates with much lower levels of uncertainty. However, the objective of this study is to estimate total emissions, so the large firm emissions are addressed in a different way.

The approach taken to estimating emissions of large firms for which sufficient emissions data were not available is to extrapolate from the emissions of smaller firms in the same SIC groups. For example, the 1993 County Business Pattern data indicate that there were sixteen "cabinet" firms operating in the three employee size groups: 50-99, 100-249, and 250-499. Only one of these firms responded to the two survey efforts carried-out in this study. The per-firm emissions of firms in the 50-99 size group were taken to be twice the mean emissions of cabinet firms with 20-50 employees (for which good data were gathered through the survey process). Uncertainty bounds were also scaled by a factor of two. Similarly, the mean and variance of emissions of firms with 100-249 and 250-499 employees were taken to be, respectively, four and eight times the mean and variance of the emissions of cabinet firms with 20-50 employees. The other categories for which emissions were extrapolated are the "not-elsewhere-classified" groups with 100-249 and 250-499 employees. The number of firms in each category for which emissions were extrapolated are presented in Table 8-1.

Table 8-1. Number of firms in categories for which emissions were extrapolated from categories of smaller firms.

Firm Category	Number of Firms
Cabinet 50 - 99	9
Cabinet 100-249	6
Cabinet 250-499	1
N.E.C. 100-249	11
N.E.C. 250-500	1

8.3 Emission Inventory Results By Region

The "bottom-up" emission inventory results presented in this report are for the calendar year 1993. Emissions were estimated for this period because the 1993 County Business Pattern (CBP) data was the most recent available at the time this work was performed. Generally, the CBP reports are available two to three years after the period covered. It was expected that while this work was being performed the 1994 CBP data would become available. Thus, based on the assumption that 1994 emissions would be estimated, the "top-down" emission estimate was performed for 1994 and comparable 1994 emission estimates were gathered from the districts. Unfortunately, the 1994 CBP data were not yet available when this work was completed. Therefore, the district and "top down" emission estimates presented in this report are for 1994 and the "bottom up" estimates are of emissions during 1993.

In Table 8-2, estimated VOC emissions from the industrial coating of wood furniture and fixtures during 1993 are tabulated for each county in California. The upper and lower bound estimates appearing in Tables in this chapter represent the 90% confidence interval for estimated emissions, as described in Chapter 6. Above and below each limit lie an estimated 5% of the probability of each estimate. Counties in which the census identified no wood furniture or fixture firms have "zero" emissions. As described in Chapter 6, there is no uncertainty associated with such estimates of zero emissions because there is no uncertainty estimate available for the County Business Pattern data of the census.

Table 8-2. 1993 Wood furniture coating VOC emission estimates by county.

County	Estimated Mean Emissions (lbs/yr)	- 95% Lower Bound (lbs/yr)	+ 95% Upper Bound (lbs/yr)
Alameda	201,206	37,199	67,137
Alpine	0	0	0
Amador	2,562	928	985
Butte	65,097	15,967	22,355
Calaveras	0	0	0
Colusa	0	0	0
Contra Costa	57,400	9,256	13,303
Del Norte	813	386	655
El Dorado	13,694	3,299	3,440
Fresno	143,338	41,092	67,785
Glenn	1,761	651	775
Humboldt	28,899	8,597	16,161
Imperial	18,928	15,392	30,746
Inyo	0	0	0
Kern	20,851	8,294	16,026
Kings	18,596	6,624	6,626
Lake	3,390	1,020	1,125
Lassen	578	299	311
Los Angeles	3,281,112	452,660	1,177,200
Madera	2,783	975	1,451
Marin	15,574	4,240	4,426
Mariposa	813	386	655
Mendocino	19,476	6,632	6,637
Merced	31,251	7,155	7,550
Modoc	0	0	0
Mono	0	0	0
Monterey	26,483	15,581	30,944
Napa	24,630	15,459	30,871
Nevada	11,146	2,694	2,761
Orange	1,021,648	176,819	723,147
Placer	26,165	15,498	30,848
Plumas	0	0	0
Riverside	301,256	48,191	65;816
Sacramento	264,358	61,404	92,056
San Benito	1,116	407	695
San Bernardino	603,423	101,437	125,147
San Diego	527,074	95,077	131,889
San Francisco	173,833	29,029	34,365
San Joaquin	160,087	37,884	55,714
San Luis Obispo	43,267	16,227	31,856
San Mateo	86,376	31,712	62,643

County	Estimated Mean Emissions (lbs/yr)	- 95% Lower Bound (lbs/yr)	+ 95% Upper Bound (lbs/yr)
Santa Barbara	28,806	8,673	16,156
Santa Clara	321,492	60,228	92,955
Santa Cruz	43,672	14,135	20,016
Shasta	24,391	15,468	30,898
Sierra	0	0	0
Siskiyou	0	0	0
Solano	49,728	23,714	47,167
Sonoma	124,988	34,381	63,994
Stanislaus	146,131	35,615	46,723
Sutter	14,391	3,487	4,056
Tehama	9,464	7,696	15,373
Trinity	578	299	311
Tulare	37,058	7,648	8,341
Tuolumne	12,402	7,763	15,498
Ventura	308,091	116,845	699,513
Yolo	7,841	1,931	3,998
Yuba	2,377	1,173	2,681
TOTAL	8,330,397	539,287	1,576,955

In Table 8-2, variation in the emission estimate uncertainties reflects the different mixtures of firms that operate in each county. Because emission estimate uncertainty reflects the uncertainties of the component estimates (i.e., firm coating usage, emission factors), counties that contain firms with less certain usage estimates will have more uncertainty in their estimated emissions. For example, there are two large furniture firms (250 to 500 employees, a size category with high usage uncertainty) in Ventura County and relatively few smaller firms. The estimated upper limit on emissions in Ventura County is approximately three times the estimated mean emissions. In contrast, Kings County has more small firms for which coating usage certainty is relatively high. The estimated upper limit on emissions in King County is less than one and a half times the estimated mean.

In Table 8-3, the estimated VOC emissions from the industrial coating of wood furniture and fixtures during 1993 are tabulated for each air quality management district in California. From Table 8-3 it is clear that emissions are concentrated in a few districts. From just the four districts with rules applying to wood furniture and fixture coating (South Coast, Ventura, San Diego, and Bay Area), an estimated eighty-four percent of emissions are released. If two additional districts, that do not have rules applying to this category of emission source (San Joaquin Valley Unified and Sacramento Metropolitan) are included, this group is responsible for approximately ninety-four percent of all emissions from this source. Where an air district included only parts of a county, that county's emissions were split based on emission estimate splits used for that county by the CARB in the past. Statewide emission estimate 95% upper and lower bounds differ slightly between Tables 8-2 and 8-3 due to rounding in the county splits and their propagation through the error estimation equations.

Table 8-3. 1993 Wood furniture coating VOC emission estimates by air quality management district.

Air Districts	Estimated Mean Emissions (lbs/yr)	- 95% Lower Bound (lbs/yr)	+ 95% Upper Bound (lbs/yr)
Great Basin Unified	0	0	0
Lake County	3,390	1,020	1,125
El Dorado	13,694	3,299	3,440
Placer	26,165	15,498	30,848
Amador	2,562	928	985
Calaveras	0	0	0
Mariposa	813	386	655
Northern Sierra	11,146	2,694	2,761
Tuolumne	12,402	7,763	15,498
North Coast Unified	30,291	8,611	16,178
Mendocino	19,476	6,632	6,637
North Sonoma	19,998	5,501	10,239
Monterey Bay Unified	71,271	21,041	36,860
Lassen	578	299	311
Modoc	0	0	0
Shasta	24,391	15,468	30,898
Siskiyou	0	0	0
South Coast	5,116,926	495,905	1,387,223
San Luis Obispo	43,267	16,227	31,856
Santa Barbara	28,806	8,673	16,156
Ventura	308,091	116,845	699,513
San Diego	527,074	95,077	131,889
Imperial	18,928	15,392	30,746
Kern	2,919	1,161	2,244
Mojave Desert	90,513	15,216	18,772
Bay Area	1,021,802	91,301	153,225
San Joaquin Valley Unified	557,177	67,806	101,215
Butte	65,097	15,967	22,355
Colusa	0	0	0
Glenn	1,761	651	775
Sacramento Metropolitan	264,358	61,404	92,056
Yolo Solano	21,267	6,688	13,348
Feather River	16,768	3,679	4,862
Tehama	9,464	7,696	15,373
TOTAL	8,330,397	536,331	1,575,041

In Table 8-4, 1994 emissions as estimated by district personnel are compared to the 1993 "bottom-up" emission estimates of this study (as presented in Table 8-3). In Table 8-4 emission estimate uncertainty is presented as an upper and lower limit on emissions rather than "plus and minus" bounds as in other tables in this chapter, still indicating the 90% confidence interval.

The estimate by the Sacramento Metropolitan Air Quality Management District (SMAQMD) is the result of a survey by the district during 1994. The emission estimate utilizes usage data from the survey and the emission factors shown in the first column of Table 7-2. As shown in Table 7-2, the emission factors used by the SMAQMD are significantly larger than those developed in this study. As a result, the SMAQMD estimate is also higher than the mean emissions estimated in this study, and even slightly higher than the 90% confidence upper bound.

The emission estimated by the San Diego AQMD is based on 113 permitted facility sources. Permits are required in the San Diego AQMD for firms using more than 500 gallons per year. Although the San Diego estimate does not include area sources, the district estimate is still slightly larger than our estimated mean, but well within the upper and lower estimate limits.

The Ventura district emission estimate is based on 1991 permits and an extrapolation from previous ARB emission estimates. The extrapolation procedure is based on 1983 ARB estimates "grown" by computing a coating use per dollar of sales in 1991 and then calculating 1994 coating use from 1994 sales dollars obtained from Dun and Bradstreet. This estimate includes both area and permitted stationary sources. Note that although the Ventura estimate is much larger than our mean emission estimate, it is well within our large estimate uncertainty bounds. The uncertainty of our estimate for Ventura is very large because there are two very large (250-499 employees) wood furniture manufacturers located in this district. As previously discussed, the uncertainty associated with the largest firms is large because of the small amount of usage data available for such firms.

Table 8-4. Comparison of 1993 wood furniture coating VOC emission estimates and 1994 emission estimates made by air quality management districts.

District	1994 District Emission Estimate (lbs/yr)	1993 Estimated Mean Emissions (lbs/yr)	95% Lower Bound (lbs/yr)	95% Upper Bound (lbs/yr)
Sacramento	374,442	264,358	202,954	356,414
San Diego	574,000	527,074	431,997	658,963
Ventura	822,000	308,091	191,246	1,007,604

Although the emissions estimates in Table 8-4 represent different years and a small number of districts, it is still possible to make some useful comparisons since emissions should not have changed dramatically over a one year period. The 1993 emission estimates are consistently lower than these three 1994 district estimates. This trend may reflect the influence of several factors (or may not be significant at all). First, this trend may indicate that districts, which typically use crude estimation techniques, tend to make conservative estimates in order not to underestimate emissions.

Alternatively, our estimation technique which relies on applicators' self-reported coating usage may underestimate emissions. However, the comparisons reported in Table 8-4 are too few to draw any conclusions regarding the accuracy of our estimates or those of the districts.

In Table 8-5 the emissions estimates are further aggregated into air basins. Again, estimated emissions in basins in which no fixture and furniture firms are reported are zero and estimate uncertainty is reported as "plus and minus" bounds around the estimated mean.

Table 8-5. 1993 Wood furniture coating VOC emission estimates by air basin.

Air Basins	Estimated Mean Emissions (lbs/yr)	- 95% Lower Bound (lbs/yr)	+ 95% Upper Bound (lbs/yr)
Great Basin Valleys	0	0	0
Lake County	3,390	1,020	1,125
Lake Tahoe	6,077	1,491	2,408
Mountain Counties	39,251	8,753	16,320
North Coast	69,765	12,182	20,263
North Central Coast	71,271	21,041	36,860
Northeast Plateau	578	299	311
South Coast	5,014,826	490,815	1,376,607
South Central Coast	380,164	118,285	700,424
San Diego	527,074	95,077	131,889
South East Desert	214,461	24,761	40,871
San Francisco	1,021,802	91,301	153,225
San Joaquin Valley	557,177	67,806	101,215
Sacramento Valley	424,301	124,105	204,653
TOTAL	8,330,397	536,331	1,575,041

8.4 Emission Inventory Results By Coating Category

Because the emission estimation methodology uses estimates of average coating usage and coating factors, it can also produce estimates of usage by coating category and emissions by coating category. These figures may be useful in forecasting HAP releases, planning regulation, and allocating technology development resources.

In Table 8-6 the estimated mean usage by coating category is presented with uncertainty bounds for mean usage. Statewide annual usage is presented for each coating subcategory and the coating category in total. The "Low-VOC" subcategory is composed mostly of water-based coatings but not exclusively so. Similarly, the "High-VOC" subcategory coatings are likely all solvent-based, but we have not verified that this is strictly true.

The clear and semi-clear top-coat category is by far the most used coating group, at over seven hundred thousand gallons per year. This is more than twice the second most used category, sealers, of which three hundred and forty four thousand gallons are used annually. The third most commonly used coating category is stains, which are used at a rate of two hundred and thirty thousand gallons per year.

Table 8-6. 1993 Wood furniture coating usage estimates by coating category.

Coating Category	Coating sub-category	Estimated Mean Usage (gal/yr)	- 95% Lower Bound (lbs/yr)	+ 95% Upper Bound (lbs/yr)
Top Coat	High-VOC	597,880	65,370	134,639
	Low-VOC	105,384	29,524	57,042
	Category Total	703,264	71,728	146,224
Wash Coat	High-VOC	86,168	36,546	76,873
	Low-VOC	67	41	119
	Category Total	86,234	36,546	76,873
Filler	High-VOC	37,206	21,443	87,824
	Low-VOC	1,703	917	1,615
	Category Total	38,909	21,463	87,839
Stains	High-VOC	157,976	31,705	113,936
	Low-VOC	72,419	26,656	55,494
	Category Total	230,394	41,422	126,732
Enamels	High-VOC	2,488	891	1,617
	Low-VOC	69	29	50
	Category Total	2,557	892	1,618
Colored	High-VOC	68,475	22,517	91,919
	Low-VOC	3,587	1,028	2,228
	Category Total	72,062	22,540	91,946
Sealers	High-VOC	320,028	46,061	104,010
	Low-VOC	23,712	5,043	9,899
	Category Total	343,740	46,336	104,480
Other	High-VOC	63,793	11,162	106,486
	Low-VOC	7,033	2,250	4,847
	Category Total	70,827	11,386	106,596
Solvent		127,885	13,323	107,910
TOTAL		1,675,874	107,796	305,692

In Table 8-7 the estimated emissions by coating category are presented. Comparing Table 8-6 and Table 8-7 the impact of low-VOC coatings can be seen plainly. Although low-VOC stains make-up thirty-one percent of stain usage, they contribute only about six percent of the category's VOC emissions. Similarly, low-VOC topcoats represent fifteen percent of topcoat usage, but make-up less than five percent of the category emissions. Low-VOC coatings, by definition, are expected to have low emissions, and the significant impact of low-VOC coatings is clear. However, the estimated use of low-VOC coatings is still much lower than that of higher VOC coatings. Overall low-VOC coatings are estimated to have made-up fourteen percent of wood furniture and fixture coatings used in California during 1993 (solvents not included in total coating usage).

Table 8-7. 1993 Wood furniture coating VOC emission estimates by coating category.

Coating Category	Coating Sub-category	Estimated Mean Emissions (lbs/yr)	- 95% Lower Bound (lbs/yr)	+ 95% Upper Bound (lbs/yr)
Top Coat	High-VOC	3,263,052	354,099	729,428
	Low-VOC	146,365	41,045	79,613
	Category Total	3,409,417	356,470	733,759
Wash Coat	High-VOC	471,997	187,297	395,336
	Low-VOC	109	67	208
	Category Total	472,106	187,297	395,336
Filler	High-VOC	113,921	65,658	271,412
	Low-VOC	2,633	1,418	2,594
	Category Total	116,555	65,673	271,425
Stains	High-VOC	874,932	175,430	630,061
	Low-VOC	51,365	18,907	40,871
	Category Total	926,297	176,446	631,385
Enamels	High-VOC	11,482	4,015	7,365
	Low-VOC	119	49	91
	Category Total	11,601	4,015	7,365
Colored	High-VOC	366,963	120,443	491,824
	Low-VOC	1,299	415	1,608
	Category Total	368,261	120,443	491,827
Sealers	High-VOC	1,779,110	255,827	577,283
	Low-VOC	39,915	8,490	16,789
	Category Total	1,819,026	255,968	577,527
Other	High-VOC	287,682	50,445	480,236
	Low-VOC	4,042	1,293	5,000
	Category Total	291,724	50,462	480,262
Solvent		915,412	103,171	716,686

8.5 Emission Inventory Results by Firm Size

Most air district rules are structured such that firms that use small amounts of coating face less stringent reporting and use requirements. For instance, a typical district rule might apply only to applicators that use more than 50 gallons of coatings per year, and applicators that use more than 500 gallons per year would be required to obtain an emission permit and keep detailed coating use records. Part of the rationalization behind exempting small users from such rules is that they produce a small fraction of the total emissions, although other issues, such as equity, financial burden and implementation may be more significant. Because wood coating rule requirements are typically tied to coating use it is useful to know how what fraction of total emissions are produced by the different size categories of firms.

In Table 8-8, total estimated emissions by firm size category are presented. The firm size category that, as a group, produces the largest fraction of the total emissions from wood furniture and fixture coating is firms with from 10 to 19 employees. Such firms produce approximately twenty-five percent of emissions. The next largest emitting size categories are firms with twenty to forty-nine and fifty to ninety-nine employees, with twenty-two and nineteen percent of emissions respectively. The smallest firms contribute a relatively small fraction of the total emissions, even though there are a large number of such firms.

The cumulative emissions for a firm category and all larger firm categories as a percentage of total emissions are presented in the sixth column of Table 8-8. We estimate that firms with ten or more employees emit ninety-one percent of the VOCs in this industry. Firms with five or more employees account for ninety-five percent of emissions. Thus rules that apply to all firms having more than five employees would impact ninety-five percent of total VOC emission from the coating of wood furniture and fixtures. The coating usage by firms in these size categories, based on coating usage estimates derived from survey data, are presented in Table 8-9.

Table 8-8. Wood furniture coating VOC emission estimates by firm size category.

Firm Size Category (employees)	Estimated Total Category Emissions (lbs/yr)	- 95% Lower Bound (lbs/yr)	+ 95% Upper Bound (lbs/yr)	Category Emissions as Percentage of Total Emissions	Cumulative Emissions as Percentage of Total Emissions*
1 - 4	412,338	42,360	44,649	5%	100%
5 - 9	354,763	40,889	90,574	4%	95%
10 - 19	2,114,858	273,627	443,150	25%	91%
20 - 49	1,822,192	157,675	162,569	22%	65%
50 - 99	1,643,079	299,289	346,186	20%	44%
100 - 249	1,052,132	200,398	232,499	13%	24%
250 - 499	931,037	240,619	1,442,178	11%	11%

*May not sum from category emissions due to rounding.

Table 8-9. Wood furniture coating usage by firm size category.

Firm Size Category (employees)	Estimated Coating Usage (gal/yr)
1 - 4	0 - 115
5 - 9	100 - 450
10 - 19	400 - 2,200
20 - 49	500 - 3,400
50 - 99	1,100 - 6,700
100 - 249	2,100 - 13,500
250 - 499	4,000 - 26,000

8.6 Modified Estimation Using District Data on Large Firms

Where local permit or compliance data are available for large firms, it might be best to estimate emissions from larger firms using these more specific and non-statistical data and estimate emissions for smaller firms by the statistical means described in this report. Tables 8-10, 8-11, and 8-12 are included to facilitate such calculations. These tables provide the same information as Tables 8-2, 8-3, and 8-5, respectively, although excluding firms larger than 50 employees.

If the uncertainty associated with large firm emissions can be eliminated (e.g., through the use of district permitting and compliance data), the range of emissions uncertainty is dramatically reduced statewide and for the larger counties and air districts. Statewide, eliminating uncertainty associated with large firms reduces the range of the 90% confidence interval from 2.11 million lbs/yr to 0.80 million lbs/year. While these large firms are responsible for roughly 44% of emissions, they are responsible for 62% of the uncertainty, as represented by the 90% confidence interval range statewide.

Most of the reduction in uncertainty applies to the Los Angeles, Orange, and Ventura counties. For Los Angeles county, large firms represent approximately 48% of emissions. However eliminating uncertainty from large firm emissions reduced the range of the 90% confidence interval from 1.63 million pound/year to 0.65 million pounds/year (a 60% reduction). For Orange and Ventura counties, the reduction in the confidence interval range is 75% and 98% respectively. For most counties, air districts, and air basins, the reductions in uncertainty from better estimating emissions from large firms are far more modest to nil.

Implementing this mixed approach to emissions estimation will require more complete and accessible data for large firms in the largest air districts. However, there may be insufficient reason to undergo such improvements for districts with relatively few large wood coating firms.

Table 8-10. 1993 Wood furniture coating VOC emission estimates by county. Firms with more than fifty employees excluded.

County	Estimated Mean Emissions (lbs/yr)	- 95% Lower Bound (lbs/yr)	+ 95% Upper Bound (lbs/yr)
Alameda	158,032	34,587	65,438
Alpine	0	0	0
Amador	2,562	928	985
Butte	40,066	10,675	17,772
Calaveras	0	0	0
Colusa	0	0	0
Contra Costa	57,400	9,256	13,303
Del Norte	813	386	655
El Dorado	13,694	3,299	3,440
Fresno	137,542	40,947	67,418
Glenn	1,761	651	775
Humboldt	28,899	8,597	16,161
Imperial	18,928	15,392	30,746
Inyo	0	0	0
Kern	20,851	8,294	16,026
Kings	18,596	6,624	6,626
Lake	3,390	1,020	1,125
Lassen	578	299	311
Los Angeles	1,693,604	269,721	381,448
Madera	2,783	975	1,451
Marin	15,574	4,240	4,426
Mariposa	813	386	655
Mendocino	19,476	6,632	6,637
Merced	31,251	7,155	7,550
Modoc	0	0	0
Mono	0	0	0
Monterey	26,483	15,581	30,944
Napa	24,630	15,459	30,871
Nevada	11,146	2,694	2,761
Orange	437,430	82,079	139,271
Placer	26,165	15,498	30,848
Plumas	0	0	0
Riverside	124,458	27,773	49,377
Sacramento	210,913	56,077	87,504
San Benito	1,116	407	695
San Bernardino	290,887	58,694	90,220
San Diego	324,164	62,604	104,306
San Francisco	104,123	22,333	27,413
San Joaquin	60,673	24,335	47,092
San Luis Obispo	37,471	15,855	31,068
San Mateo	86,190	31,711	62,643

County	Estimated Mean Emissions (lbs/yr)	- 95% Lower Bound (lbs/yr)	+ 95% Upper Bound (lbs/yr)
Santa Barbara	28,806	8,673	16,156
Santa Clara	208,608	52,165	86,808
Santa Cruz	24,437	8,411	16,320
Shasta	24,391	15,468	30,898
Sierra	0	0	0
Siskiyou	0	0	0
Solano	43,932	23,461	46,639
Sonoma	119,192	34,206	63,605
Stanislaus	92,686	25,350	36,956
Sutter	14,391	3,487	4,056
Tehama	9,464	7,696	15,373
Trinity	578	299	311
Tulare	37,058	7,648	8,341
Tuolumne	12,402	7,763	15,498
Ventura	45,523	8,200	10,499
Yolo	7,841	1,931	3,998
Yuba	2,377	1,173	2,681
TOTAL	4,704,150	321,247	482,709

Table 8-11. 1993 Wood furniture coating VOC emission estimates by air quality management district. Firms with more than fifty employees excluded.

Air Districts	Estimated Mean Emissions (lbs/yr)	- 95% Lower Bound (lbs/yr)	+ 95% Upper Bound (lbs/yr)
Great Basin Unified	0	0	0
Lake County	3,390	1,020	1,125
El Dorado	13,694	3,299	3,440
Placer	26165	15498	30848
Amador	2,562	928	985
Calaveras	0	0	0
Mariposa	813	386	655
Northern Sierra	11,146	2,694	2,761
Tuolumne	12,402	7,763	15,498
North Coast Unified	30,291	8,611	16,178
Mendocino	19,476	6,632	6,637
North Sonoma	19,071	5,473	10,177
Monterey Bay Unified	52,036	17,711	34,991
Lassen	578	299	311
Modoc	0	0	0
Shasta	24,391	15,468	30,898
Siskiyou	0	0	0
South Coast	2,502,746	287,657	416,194
San Luis Obispo	37,471	15,855	31,068
Santa Barbara	28,806	8,673	16,156
Ventura	45,523	8,200	10,499
San Diego	324,164	62,604	104,306
Imperial	18,928	15,392	30,746
Kern	2,919	1,161	2,244
Mojave Desert	43,633	8,804	13,533
Bay Area	786,749	82,966	147,162
San Joaquin Valley Unified	398,521	55,829	92,148
Butte	40,066	10,675	17,772
Colusa	0	0	0
Glenn	1,761	651	775
Sacramento Metropolitan	210,913	56,077	87,504
Yolo Solano	19,702	6,622	13,212
Feather River	16,768	3,679	4,862
Tehama	9,464	7,696	15,373
TOTAL	4,704,150	319,019	478,462

Table 8-12. 1993 Wood furniture coating VOC emission estimates by air basin. Firms with more than fifty employees excluded.

Air Basins	Estimated Mean Emissions (lbs/yr)	- 95% Lower Bound (lbs/yr)	+ 95% Upper Bound (lbs/yr)
Great Basin Valleys	0	0	0
Lake County	3,390	1,020	1,125
Lake Tahoe	6,077	1,491	2,408
Mountain Counties	39,251	8,753	16,320
North Coast	68,838	12,169	20,232
North Central Coast	52,036	17,711	34,991
Northeast Plateau	578	299	311
South Coast	2,457,184	284,578	411,497
South Central Coast	111,800	19,846	36,558
San Diego	324,164	62,604	104,306
South East Desert	111,042	19,075	35,735
San Francisco	786,749	82,966	147,162
San Joaquin Valley	398,521	55,829	92,148
Sacramento Valley	344,259	113,421	195,384
TOTAL	4,704,150	319,019	478,462

8.7 Discussion

The accuracy of the estimates summarized in Tables 8-2 through 8-7 is affected by several external factors. Two of these, the lack of an estimate of census data uncertainty and the difficulty of estimating emission of the largest furniture manufacturing firms, are discussed elsewhere in this chapter. Where local data are available to provide better estimates of emissions from large firms (with more than 50 employees), Tables 8-10 and 8-11 can be used to significantly narrow emission estimate uncertainty.

An additional source of uncertainty is use of finishing contractors. The extensive use of finishing shops for furniture coating and the finishing of cabinets by installers complicates the estimation of wood coating emissions because it reduces the data available and increases the uncertainty in what and how coatings are applied. It would seem that data from finishing contractors could be used in the estimation procedure, but these data are not useful in this effort for two reasons. First, if coating usage is estimated based on an estimate of furniture production, this would include coatings applied by finishers. Data from finishing shops would "double count" the coating usage based on furniture manufacture. There is no way in census or business data to separate the firms that perform their own coating from those that utilize finishers. Second, the data from finishers would be highly uncertain. In this study six finishing firms were contacted to determine if it would be useful to survey finishing firms. Generally, finishers were found to perform finishing of many different types of products and to keep records of coating usage but not the type of product finished. Finishers were unable (or unwilling) to determine from their records application rates of specific coatings for just wood products.

Further discussion of the sources of estimation error and recommendations for improving estimate accuracy are presented in Chapter 10.

9
Top-Down Emission Estimates

9.1 Introduction

When estimating and forecasting, it is desirable to have as many independent estimates as possible. Agreement between independent estimates increases confidence in using any individual estimate or some type of mean of available estimates. Even estimates that are known to be biased are useful for corroborating "better" estimates if they have the expected relationship to the more accurate estimate.

In this study, the primary estimation procedure is based on wood coating usage as measured by a survey of individual applicators. This is commonly termed a "bottom-up" approach to estimating emissions because it aggregates estimates of emissions from a great many categories to produce an estimate of total emissions. One type of independent estimate of emissions from the coating of wood furniture would be an estimate based on the sales of wood coatings in California. An estimate based on production or sales of coatings is termed a "top-down" approach because it estimates total emissions (based on total usage) and produces estimates of emissions by business and coating category by disaggregating the total emissions estimate.

A top-down estimate based on total wood coating usage or sales in California is difficult because sales data are competition sensitive and proprietary. Over thirty-five manufacturers, distributors, and trade organizations were contacted during this study in an effort to collect information on sales by category of wood coatings in California. No usable sales data could be obtained. The best alternative estimation approach is to estimate wood coating use in California as a fraction of total U.S. consumption. This method is approximately equivalent to the currently used method for assessing emissions from this source category (ARB 1990; ARB 1982). In the following section, the top-down estimation method used in this study is described and compared to the area source emission estimate method developed and used by the ARB.

9.2 Method of Approach

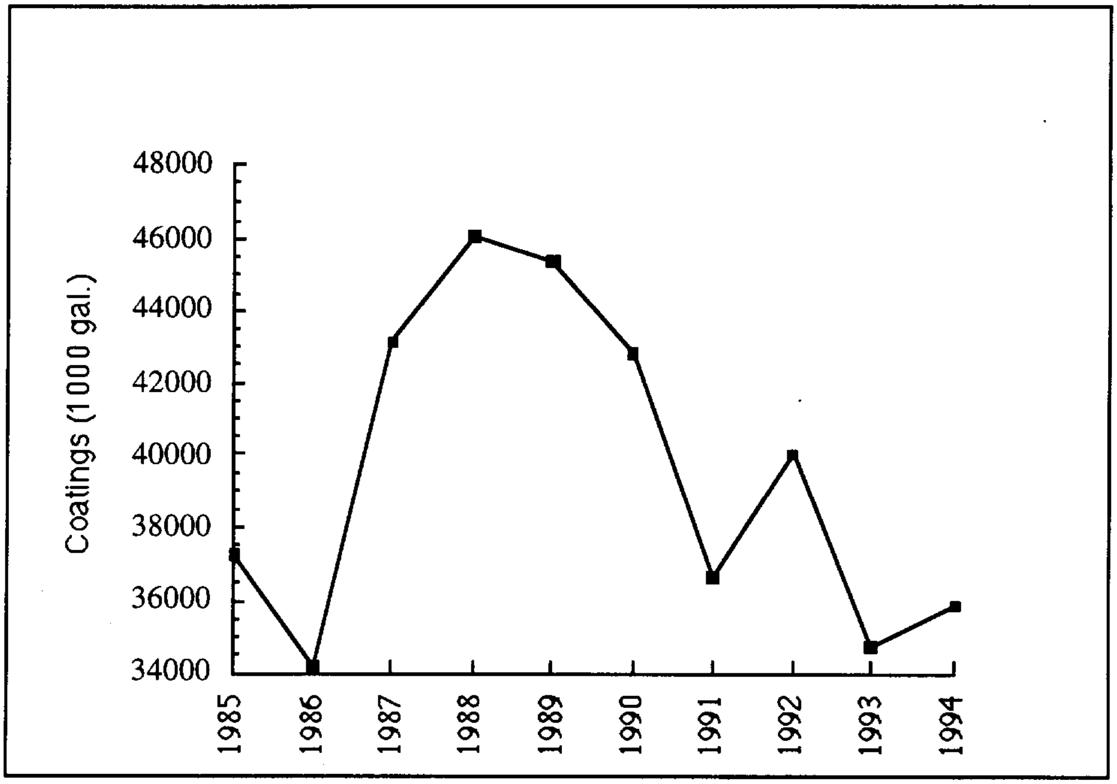
The emission estimates of volatile organic compounds (VOC) emissions are based upon national production data from the 1994 *Current Industrial Reports - Paint and Allied Products* (Census 1994) and emission factors developed during this study (see Chapter 6). A method of top-down estimation developed by the ARB uses emission factors derived from results of 1976 and 1977 surveys of manufacturing industries and paint manufacturers performed by the Stationary Source Division (SSD), Air Resources Board (ARB 1982). The emission factor used by the ARB in 1982 and 1987 emission estimates for this category of emission source (CES 66670) was 3210 lbs/1000 gallons of coating. Due to the implementation of various district and ARB rules (e.g., SCAQMD Rule 1136), emission factors are expected to have changed significantly.

The amount of coatings used in the Wood Furniture & Fixtures Coatings source category is based upon the national production data for 1994 (Census 1994). It is assumed that the amount used is equal to the amount produced. California's use fraction of the Wood Furniture & Fixtures Coatings was estimated by multiplying national production by the ratio of California employment in the wood furniture and fixture related SICs to that of the nation.

It is a dangerous practice to predict wood furniture coating production based on growth factors calculated from the change in production over the past year. Previous ARB estimates of coating production have relied on this simple forecasting technique. As can be seen from Figure 9-1, during the past ten years, projecting the previous year's change in production forward to estimate the next year's production would have generated very poor estimates in most years.

The distribution of coating consumption in California counties is assumed to be the same as that obtained from the 1977 survey by the SSD, ARB.

Figure 9-1. U.S. Total Wood Furniture & Fixture Coatings shipped (1000 gal.) (Census, 1994).



ASSUMPTIONS

1. The national production data from the Bureau of the Census represent the amount of wood furniture & fixture coatings consumed nationwide. Census Bureau computation of apparent consumption of all Paint, Varnish, and Lacquer (product codes 28511, 28512, and 28513) in 1991 showed that apparent consumption was 97 percent of the national production. Thus, this assumption is deemed reasonable.

2. The amounts of wood furniture & fixture coatings used in California can be estimated from national production data and by the ratio of California employment in wood furniture and fixture related SICs to that of the nation. There is likely to be large error associated with this assumption, however, this is the best available information and is an improvement on previous ARB practice of using the ratio of California population to that of the entire U.S.
3. The 1994 distribution of wood furniture & fixture coatings usage and emissions to the counties can be based on the distribution obtained from the 1977 ARB survey. The alternative to this assumption is to use census data and distributional data from the user survey performed during this study. There are valid arguments for both distributions. The 1977 ARB data are used because it maintains some of the independence of the top-down and bottom-up techniques.

SAMPLE CALCULATIONS

1. Estimate Usage for California

Nationwide production of wood furniture & fixture coatings during 1994 equals consumption.

1994 production = 35.86 million gallons

(Number of gallons of wood furniture & fixture coatings) = (production) X (CA % of total U.S. employment in wood furniture and fixture SICs)

= (35.86 million gal.) X (33,320/360,230) = 3.32 million gal.

2. Estimate Emissions for Alameda County

Total emissions in tons/yr from the use of wood furniture & fixture coatings in Alameda County is estimated as follows:

(1994 usage) X (% used in Alameda Co.) X (Emission Factor)

= (3.32 million gal.) X (5.05 %) X (3971 lbs/1000 gal.) X (1 ton/2000 lb)

= 305.62 tons VOC emissions per year

9.3 Top-Down Emission Estimates

This section presents a summary of the results of the top-down estimate of emissions from wood furniture and fixture coating operations in California during 1994. This estimate is the result of application of the estimation procedure described in the previous section for each county. This section also contains a comparison of the 1994 top-down emission estimate with the 1983 top-down estimate developed by the CARB and with bottom-up emission estimates (as presented in Chapter 8).

Table 9-1 contains the results of the top-down emission estimate for 1994 organized by air basin. Note that several counties are split between air basins and so appear twice in the table. The second column of Table 9-1 contains the process rate in thousands of gallons and totals to the 3.32 million gallons of coating assumed to be used in California based on employment in wood furniture and fixture related SICs. The third column contains estimated VOC emissions in tons per year.

Table 9-1. 1994 Wood furniture coating emission estimates based on coating production by air basin.

Air Basin	County	Process rate (1000 gal.)	VOC Emissions (tons/year)
GBU	Alpine	0.00	0.00
	Inyo	0.00	0.00
	Mono	0.00	0.00
LC	Lake	0.00	0.00
LT	El Dorado	0.72	1.43
	Placer	0.31	0.62
MC	Amador	1.93	3.84
	Calaveras	0.55	1.09
	El Dorado	1.61	3.20
	Mariposa	0.00	0.00
	Nevada	2.45	4.87
	Placer	0.50	1.00
	Plumas	0.00	0.00
	Sierra	0.00	0.00
	Tuolumne	0.00	0.00
NC	Del Norte	2.69	5.34
	Humboldt	16.51	32.81
	Mendocino	10.51	20.89
	Sonoma	3.68	7.31
	Trinity	0.00	0.00
NCC	Monterey	17.89	35.55
	San Benito	3.07	6.10
	Santa Cruz	17.93	35.62
NEP	Lassen	0.00	0.00
	Modoc	0.00	0.00
	Siskiyou	4.60	9.15
SC	Los Angeles	1558.41	3096.55
	Orange	338.16	671.92
	Riverside	32.62	64.83
	San Bernardino	57.39	114.02

Table 9-1 (completed)

Air Basin	County	Process rate (1000 gal.)	VOC Emissions (tons/year)
SCC	San Luis Obispo	4.95	9.84
	Santa Barbara	27.52	54.69
	Ventura	37.50	74.51
SD	San Diego	152.97	303.96
SED	Imperial	3.45	6.86
	Kern	2.42	4.80
	Los Angeles	16.39	32.56
	Riverside	9.80	19.48
	San Bernardino	10.16	20.18
SF	Alameda	167.49	332.81
	Contra Costa	53.21	105.73
	Marin	6.74	13.38
	Napa	6.74	13.38
	San Francisco	84.21	167.32
	San Mateo	60.49	120.20
	Santa Clara	363.32	721.91
	Solano	7.49	14.88
	Sonoma	19.46	38.66
SJV	Fresno	43.52	86.47
	Kern	15.11	30.02
	Kings	5.37	10.67
	Madera	4.44	8.82
	Merced	10.29	20.45
	San Joaquin	9.11	18.10
	Stanislaus	37.50	74.51
	Tulare	17.26	34.30
SV	Butte	4.92	9.77
	Colusa	0.38	0.76
	Glenn	1.70	3.38
	Placer	3.58	7.12
	Sacramento	33.93	67.42
	Shasta	0.00	0.00
	Solano	2.74	5.44
	Sutter	3.89	7.73
	Tehama	4.09	8.12
	Yolo	10.59	21.04
	Yuba	2.69	5.34
TOTAL		3316.92	6590.73

9.4 Comparison of Top-Down and Bottom-Up Emission Estimates

In Table 9-2 the 1994 top-down emission estimate is compared with the 1983 top-down estimate developed by the CARB and with 1993 bottom-up emission estimates (as presented in Chapter 8.

As can be seen in Figure 9-1, national coating production increased 3.2 percent between 1993 and 1994, from 34.747 million gallons to 35.893 million gallons. Accordingly, in the "top down" emission methodology, if employment has not changed significantly, emissions will also increase approximately 3.2 percent between 1993 and 1994. Therefore, with this anticipated 3.2 percent increase in annual emissions in mind, 1993 "bottom up" emission estimates can be compared with 1994 "top down" estimates.

Table 9-2. Comparison of top-down and bottom-up VOC emission estimates.

County	1983 Top-Down Emissions Estimate (tons/yr.)	1994 Top-Down Emissions Estimate (tons/yr.)	1993 Bottom-Up Emissions Estimate (tons/yr)	- 95% Lower Bound (lbs/yr)	+ 95% Upper Bound (lbs/yr)
Alameda	305.62	332.81	100.60	18.60	33.57
Alpine	0.00	0.00	0.00	0.00	0.00
Amador	3.53	3.84	1.28	0.46	0.49
Butte	8.97	9.77	32.55	7.98	11.18
Calaveras	1.00	1.09	0.00	0.00	0.00
Colusa	0.70	0.76	0.00	0.00	0.00
Contra Costa	97.09	105.73	28.70	4.63	6.65
Del Norte	4.90	5.34	0.41	0.19	0.33
El Dorado	4.25	4.63	6.85	1.65	1.72
Fresno	79.41	86.47	71.67	20.55	33.89
Glenn	3.10	3.38	0.88	0.33	0.39
Humboldt	30.13	32.81	14.45	4.30	8.08
Imperial	6.30	6.86	9.46	7.70	15.37
Inyo	0.00	0.00	0.00	0.00	0.00
Kern	31.98	34.82	10.43	4.15	8.01
Kings	9.80	10.67	9.30	3.31	3.31
Lake	0.00	0.00	1.70	0.51	0.56
Lassen	0.00	0.00	0.29	0.15	0.16
Los Angeles	2873.51	3129.11	1640.56	226.33	588.60
Madera	8.10	8.82	1.39	0.49	0.73
Marin	12.29	13.38	7.79	2.12	2.21
Mariposa	0.00	0.00	0.41	0.19	0.33
Mendocino	19.18	20.89	9.74	3.32	3.32
Merced	18.78	20.45	15.63	3.58	3.77
Modoc	0.00	0.00	0.00	0.00	0.00
Mono	0.00	0.00	0.00	0.00	0.00
Monterey	32.65	35.55	13.24	7.79	15.47
Napa	12.29	13.38	12.31	7.73	15.44
Nevada	4.47	4.87	5.57	1.35	1.38
Orange	617.03	671.92	510.82	88.41	361.57
Placer	1.49	8.74	13.08	7.75	15.42

County	1983 Top-Down Emissions Estimate (tons/yr.)	1994 Top-down Emissions Estimate (tons/yr.)	1993 Bottom-Up Emissions Estimate (tons/yr)	- 95% Lower Bound (lbs/yr)	+ 95% Upper Bound (lbs/yr)
Plumas	0.00	0.00	0.00	0.00	0.00
Riverside	77.42	84.31	150.63	24.10	32.91
Sacramento	61.91	67.42	132.18	30.70	46.03
San Benito	5.60	6.10	0.56	0.20	0.35
San Bernardino	123.24	134.20	301.71	50.72	62.57
San Diego	279.13	303.96	263.54	47.54	65.94
San Francisco	153.65	167.32	86.92	14.51	17.18
San Joaquin	16.62	18.10	80.04	18.94	27.86
San Luis Obispo	9.04	9.84	21.63	8.11	15.93
San Mateo	110.38	120.20	43.19	15.86	31.32
Santa Barbara	50.22	54.69	14.40	4.34	8.08
Santa Clara	662.94	721.91	160.75	30.11	46.48
Santa Cruz	32.71	35.62	21.84	7.07	10.01
Shasta	0.00	0.00	12.20	7.73	15.45
Sierra	0.00	0.00	0.00	0.00	0.00
Siskiyou	8.40	9.15	0.00	0.00	0.00
Solano	18.66	20.32	24.86	11.86	23.58
Sonoma	42.21	45.96	62.49	17.19	32.00
Stanislaus	68.42	74.51	73.07	17.81	23.36
Sutter	7.10	7.73	7.20	1.74	2.03
Tehama	7.46	8.12	4.73	3.85	7.69
Trinity	0.00	0.00	0.29	0.15	0.16
Tulare	31.50	34.30	18.53	3.82	4.17
Tuolumne	0.00	0.00	6.20	3.88	7.75
Ventura	68.42	74.51	154.05	58.42	349.76
Yolo	19.32	21.04	3.92	0.97	2.00
Yuba	4.90	5.34	1.19	0.59	1.34
TOTAL	6045.82	6590.73	4165.20	269.64	788.48

9.5 Discussion

From Table 9-2 it can be seen that the top-down estimate of 1994 emissions is only 9 percent greater than the 1983 top-down estimate. Although the methodologies of the two top-down estimates are not identical this is a small increase over a decade. (Previous CARB study estimated a 54.2 percent increase in VOC emission in CES 66670 between 1979 and 1983 [CARB 1990].) There are two differences between the 1983 and 1994 top-down estimation methodologies. The 1994 top-down estimate is based on employment in wood furniture related SICs in California as opposed to California population. The 1994 California population is 12 percent of the U.S. total, while California employment in these SICs is 9.25 percent. The other difference is use of the 1994 emission factor estimate which is 23.8 percent higher than that used in 1983. It is unclear why the 1994 emission factor should be higher than that used in 1983. Significant increases in the use of low-VOC coatings over this period should have lowered the emission factor. It is possible that the 1983 emission factor was adjusted to account for coatings that are produced but not applied, however this type of adjustment would be more appropriately made to the estimate of coating use.

It is interesting to note that if the 1983 emission factor is used in the 1994 top-down estimation methodology with the 1994 SIC employment data there would be an apparent decrease in emissions of 11.9 percent from 6,046 tons to 5,324 tons over the decade from 1983 to 1994.

Another interesting comparison is of the 1994 top-down estimate in column three of Table 9-2 with 1993 bottom-up estimate in columns four through six. The total 1993 emissions estimated through the bottom-up methodology is 36.8 percent less than the top-down estimate. The bottom-up estimate is even 22 percent less than the top-down estimate of 5,324 tons per year computed using 1994 production data and the 1983 emission factor. The difference in 1993 and 1994 emission estimates is much greater than could be expected due to annual variation in usage.

There are several possible explanations for this discrepancy. The top-down estimation method is based on several very rough approximations. It assumes that all coatings that are manufactured in the U.S. are sold and used. In fact, there is certainly some "shrinkage" due to coatings that are never used and waste portions that are disposed as waste and thus may not result in emissions. The top-down estimation methodology also assumes that California total coating usage is proportional the California fraction of total U.S. employees in the wood furniture and fixture related SICs. It is possible that because of strict district rules, California firms have invested in more efficient application equipment than firms in other states, and that California firms on average use less coating material per employee.

The bottom-up estimate is also subject to many possible biases that have been discussed elsewhere in this report. Perhaps the most insidious of these is that respondents to the survey may tend to be those applicators that are most progressive in their use of efficient application technologies and low-VOC coatings and are thus anxious to describe their efforts. Respondents may also be motivated to under-report their usage knowing that the data they provide may be used in formulating regulation for their industry.

Although the top-down and bottom-up emission estimation methodologies are different and there is significant disagreement between the estimated emission levels, comparisons of gross trends should be valid. Columns 2 and 4 of Table 9-2 represent the distribution of estimated emissions among counties in 1983 and 1993 respectively. The distribution of emissions in California appears to have changed between 1983 and 1993. Although there are exceptions, and trends are obscured by the differences in total emission levels, there appears to have been a shift of emissions out of the more highly regulated districts into non-regulated districts. This trend has been observed in other studies of California air emissions as well (Henderson 1996). In Table 9-2, it appears that emissions levels are significantly reduced in counties located in air districts with wood furniture rules such as Alameda, San Francisco, Santa Clara, San Mateo, Los Angeles, and Orange counties. However, San Bernardino and Ventura county are exceptions to this trend. Counties that have seen increases in emissions (despite the apparent reduction in total emissions) include Butte, Sacramento, San Joaquin, and San Luis Obispo.

The available data are not sufficient to be confident that apparent shifts in emissions are valid, much less to substantiate any cause and effect relationships. Trends in emission growth tend to follow general population growth trends, and so may not reflect the impact of regulation. In addition, most wood furniture rules have only been phased-in during the early 1990s, so changes in emission geography since 1983 may reflect the influence of many different factors, and trends in emission location may have changed direction several times during this period.

10
Conclusions

This report describes updated methods for estimating VOC emissions from the application of coatings in the wood furniture and fixtures industry. Specific results presented include:

1. VOC estimates of the amount of coatings used in the industrial surface coating of wood furniture and fixtures;
2. emission factors for each coating application category;
3. "top down" and "bottom up" estimates of emissions by region and coating category for 1994 and 1993 respectively;
4. estimated uncertainty for coating use, emission factors, and emission estimates; and
5. a method of updating the industrial coating of wood furniture and fixtures emission inventory using census data.

While performing this study a great deal of useful information about the wood furniture and fixture manufacturing industry has been collected. An attempt has been made to incorporate such "auxiliary" information into this report where appropriate. In this chapter, general conclusions and recommendations formulated during the project are presented.

10.1 Structure of Industry

Characteristics of this industry make estimating emissions particularly difficult. A significant proportion of furniture and fixture manufacturers use finishing contractors rather than perform finishing themselves. The extensive use of finishing shops for furniture coating and the finishing of cabinets by installers complicates the estimation of wood coating emissions because it reduces the data available and increases the uncertainty and variability in what and how coatings are applied.

Furniture manufacturers claim to be frustrated by reporting requirements and frequent changes in rules that have required them to make repeated changes in equipment and procedures. We found manufacturers to be suspicious of and uncooperative in the survey process.

The district rules that apply to the wood furniture and fixture industry have indeed been changing rapidly in recent years. While this study was underway, the South Coast District made significant revisions to its Rule 1136 twice and most districts have exempted acetone from their lists of reportable VOCs. The rapidly changing regulatory environment, and associated changes in industry, complicate the emission estimation problem. Practices in this industry have been changing very rapidly and emission levels are therefore moving targets that are difficult to estimate accurately.

10.2 Estimation Methodology

The emission estimation method developed in this study attempts to develop standard coating use profiles of firms in the wood furniture and fixture industry. Given that valid statistical profiles can be formed, the emission estimate is computed by multiplying three terms: the number of firms in a category (as measured by census data); the estimate of coating usage per firm in each firm size category; and estimates of emission factors for each coating category. This type of estimator has the advantage that it uses a relatively small amount of information and is flexible enough that it can be used to explore how changes in coating use and formulation rules will affect emissions.

The primary weakness of the estimation methodology is that it depends on accurate survey data from a statistically valid sample of firms. This program involved an intense survey procedure aimed at wood furniture and fixture manufacturers. Despite these efforts, only the minimum amount of coating information needed for valid emission estimates could be obtained.

As discussed in Chapter 8, the uncertainty in estimates for the largest-emission counties can be reduced dramatically if local district permit and compliance data can be used to substitute for less certain statistical estimates for large firms. Statewide, firms with fifty or more employees contribute an estimated 44% of emissions, but account for 62% of the uncertainty in statewide emissions for this industry.

Updating the bottom up emission estimate requires updating the number of firms in business and the estimates of coating usage and emission factors. If coating formulations have not changed appreciably since emission factors were estimated, updating the emission estimate is simply a matter of updating the business activity data in the estimator with the latest census figures. As regulation and technology induce changes in the formulations of wood furniture coatings, the coating emission factors will have to be updated. Local air district permit and compliance data might have uses here as well.

10.3 Emission Estimates

Estimates of VOC emissions from the industrial coating of wood furniture and fixtures are presented in this report. Estimates are organized and presented in several ways to facilitate different uses of the data. Emission estimates are presented grouped by county, air district and air basin, as well as by coating category and firm category.

Emissions are shown to be concentrated in a small number of air districts. Four districts that have rules regulating wood furniture coating, account for an estimated eighty-four percent of emissions (South Coast, Ventura, San Diego, and Bay Area). If two additional districts that do not have rules applying to this category of emission are included (San Joaquin Valley Unified and Sacramento Metropolitan), this group is responsible for approximately ninety-four percent of all emissions from this category.

Although there are many small furniture and cabinet manufacturers in California, the majority of emissions are the product of the medium size firms. Firms with 10 to 19 employees are estimated to produce twenty-five percent of all emissions in this source category. Cumulatively, all firms with ten or more employees emit ninety-one percent of the VOCs in this industry. Firms with five or more employees account for ninety-five percent of emissions.

The use of low-VOC coatings is having a significant impact on emissions, but such coatings are still not used widely. For example, although low-VOC stains make-up thirty-one percent of stain usage, they contribute only about six percent of the category's

VOC emissions. Similarly, low-VOC topcoats represent fifteen percent of topcoat usage, but make-up less than five percent of the category emissions. Overall low-VOC coatings are estimated to have made-up fourteen percent of wood furniture and fixture coatings used in California during 1993.

Comparison of the "bottom-up" estimation methodology with air district estimates and a "top-down" estimate based on coating production indicate that the "bottom-up" estimates are reasonable, within about 60% of the "bottom-up" estimate statewide, although estimates can vary considerably by county. Estimate uncertainty is large because of limited information, particularly about the small number of large firms. Each method of estimation has its own biases and it is difficult to draw any conclusions about which method produces the most accurate estimates. However, the bottom-up estimates should behave the most consistently, since they can be more directly tied to local business activity and regulations.

Comparison of 1993 emission estimates with 1983 estimates performed by the ARB indicate that there have been substantial changes in the geographic distribution of emissions over this period. There appears to be a trend for emissions to increase more slowly in more highly developed and regulated regions and increase in the less developed and less regulated regions. This trend is probably the result of many different social forces including the influence of regulation on emission rates, the natural pattern of development in the State, as well as some actual transfer of emissions between regions due to the migration of businesses.

10.4 Recommendations

There are several things that can be done to increase the value of this study and to improve future emission inventories in this source category.

The "bottom-up" emission estimates should be updated with more recent County Business Pattern data as they become available. These data should be available soon and estimates can be updated using new business pattern data quickly and easily. Updated emission estimates will clarify the comparisons between the "top down" and "bottom up" estimates, as well as comparisons with district estimates.

Future emission estimates should be based on as much coating usage data as possible. A relatively easy way to acquire more data, that was not possible during this study, would be to standardize the reporting requirements of the districts so that data collected through normal district rule enforcement would be available for statewide analyses. Current district reporting requirements limit this type of estimation effort in two ways. Applicators naturally feel that since they are reporting usage information to the districts they should not have to spend additional time and money to provide these data to another government agency, so data are difficult to collect though non-district channels. However, the districts have different reporting periods, different coating categories, and different reporting requirements, so data from different districts are generally not compatible with each other. Most districts do not computerize data and many do not even retain records after they have been spot-checked for compliance. Thus the data and the effort that went into their production is lost. There appears to be potential for improving both emission estimation procedures and other functions through the development and application of standardized data collection, storage, and retrieval protocols, perhaps established by CAPCOA.

Another way to improve the accuracy of the "bottom up" estimation method is to eliminate the categories of large firms from the estimation. The emissions of these firms are reported through permit and compliance processes so their emissions are known. Because there are few large firms, their coating use can not be accurately estimated through a statistical process such as used in this study. Replacing estimates for the large firms with local air district data would greatly decrease the overall emission estimate uncertainty. This applies particularly to the largest-emission districts. This too would require some refinement in local district data gathering, specifications, and accessibility.

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Appendix A

Initial Coatings Sample Analyses Performed During 1995

FOREWORD TO APPENDICES A & B

The following appendices, A and B, contain analyses of various wood coatings requested by the Air Resources Board in conjunction with the data collection effort for the emission estimation study, the main focus of this research project. The chemical analyses were added as a separate task to the original project proposal. The UC Davis investigators only collected samples that were intended to represent a range of coating types used in the wood furniture and fixtures industry, based upon survey results. The analyses were conducted by the Department of Chemistry at California Polytechnic State University, San Luis Obispo (Cal Poly SLO) under the direction of Professor A. Censullo at the request of the ARB, since at that time Professor Censullo was completing a study of analytical methods for architectural coatings. The analyses were performed using methods described in their report to the Air Resources Board: "Improvement of Speciation Profiles for Architectural and Industrial Maintenance Coating Operations," ARB Report for Contract No. 93-319, June, 1996. The water-based coatings were analyzed by a direct injection method that involved dilution with solvent, centrifugation to separate solids and followed by injection of the centrifugate into the gas chromatograph/mass spectrometer (GC/MS). The solvent-based samples were analyzed with a distillation method under reduced pressure using a dioctyl phthalate and tetradecane dispersant of the sample followed by a liquid nitrogen cold trap and analysis by direct injection of the trapped components into the GC/MS.

Given the volatility of the industry in terms of reformulations to meet increasingly stringent VOC content regulations, it seemed best to select a wide variety of products, rather than a statistical sample. A statistical sample would have been difficult to determine from the survey results and would likely have only transitory significance. A broader reconnaissance was felt to be more useful at this time for determining the presence of previously unidentified toxic components, one purpose for the GC/MS analyses. Those coatings in Appendix A were initially sampled to represent widely used categories of coatings and were collected from companies that actually produced wood furniture or fixtures. Those coatings in Appendix B were drawn at the request of the ARB staff to provide additional representation of coatings sold in the Southern California and Bay Area, and were chosen to represent top-coats and stains from a variety of manufacturers that were mentioned in the survey results. The purpose for obtaining additional representation from the South Coast and San Francisco Bay area was because firms in those districts sell coatings that are compliant with local air emission rules. Many other air districts do not have such rules.

The speciation profiles that were determined for the various types of coatings during this can be used for future improvements to photochemical modeling efforts (i.e. it will be possible to take into consideration reactivity of specific components rather than simply total VOC content). Another potential use of the profiles is for source reconciliation. For example, ambient samples containing relatively high concentrations of certain characteristic compounds such as high ketones, acetates and/or butoxy alcohol proportions or unique "signature" compounds, e.g., glycols in the profiles might be related to wood coatings. Nevertheless, because of the presence of other sources of these types of compounds in the ambient air, and the differing reactivity of some components, successful source apportionment may not be possible.

Appendix A lists the GC/MS results for 22 coating samples analyzed during 1995, and Appendix B lists the GC/MS results of 15 additional coating samples analyzed during years 1996-7. In Appendix A and B, only generic information regarding the sample and the detailed speciation profiles are provided. The coatings in Appendix A were collected "as applied," however, it turned out that in no case was the "as sold" coating diluted.

Therefore, the analyses are representative of the manufactured product and do not require correction for dilution for inventory purposes. The coatings analyzed in the second sample collection effort represent "as sold" coatings from districts having low VOC coating requirements, i.e., the SCAQMD and the BAAQMD. The corresponding GC/MS results from each sample are reported in Tables A1 through A22 and Tables B1 through B15, respectively.

It should be noted that glycerol (glycerin, B.P. 290 °C) was noted by the Cal Poly analysts to be present in some water-based coatings. Although technically not a VOC and unlikely to be determined completely as a VOC by ASTM Method 2369, glycerol exerts a small vapor pressure at room temperatures and will eventually volatilize if unreacted. In comparing the VOC content of the coating reported by the manufacturers, it was evident that glycerol was not being counted as contributing to the VOC content of the coating. The sum of the VOC components determined by GC/MS analyses, excluding glycerol, summed quite closely to the reported VOC content. Therefore, if it is the intent to count the total reactive volatile organic compound content of a solvent released into the atmosphere, ASTM method 2369 is not appropriate to the newer water-based solvent formulations.

As discussed in Chapter 5 of the report, acetone was a major component of some, but not all low VOC coatings. Thus its future use will likely be manufacturer and coating category specific. Although the initial steps in the rate of attack of acetone are relatively slow, either by photolysis or hydroxyl radical attack, once the initial reaction step takes place, further rapidly reacting species, e.g., alkyl, alkoxyl or peroxy radicals are formed and eventually contribute to an increased "background" reactivity of the troposphere. The large scale environmental effects of the widespread use of the reactivity exemption for acetone should be examined if that has not already been done. Lastly, we note that no unexpected or unusual toxic compounds were identified during the speciation studies.

Table A1. Sample #1 (Semi Gloss Lacquer).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Res Factor	Adjusted Area	Fraction
1	17.329	474.8	acetone	4.379	4.287	4.333	0.515	8.414	0.0647
2	17.772	486.2	2-propanol	10.713	10.471	10.592	0.54	19.615	0.1508
3	23.233	572.0	methyl ethyl ketone	8.656	8.514	8.585	0.63	13.627	0.1047
4	26.439	612.8	isobutyl alcohol	1.984	2.001	1.992	0.68	2.930	0.0225
5	29.771	645.9	butyl alcohol	2.687	2.736	2.711	0.7	3.873	0.0298
6	37.505	722.6	methyl isobutyl ketone	9.988	9.918	9.953	0.75	13.270	0.1020
7	40.57	749.9	1,2,3-trimethylcyclopentane	0.014	0.012	0.013	1	0.013	0.0001
8	41.399	757.7	toluene	22.994	23.035	23.015	1	23.015	0.1769
9	41.872	762.1	2,3-dimethylhexane	0.017	0.018	0.017	1	0.017	0.0001
10	42.079	764.0	3-ethyl-2-methylpentane	0.004	0.004	0.004	1	0.004	0.0000
11	42.381	766.8	2-methylheptane	0.177	0.184	0.180	1	0.180	0.0014
12	42.566	768.6	4-methylheptane	0.05	0.051	0.051	1	0.051	0.0004
13	42.877	771.5	3,4-dimethylhexane	0.013	0.014	0.013	1	0.013	0.0001
14	43.21	774.6	3-methylheptane	0.132	0.139	0.135	1	0.135	0.0010
15	43.366	776.0	3-ethylhexane	0.023	0.022	0.023	1	0.023	0.0002
16	43.633	778.5	3,3-dimethylhexane	0.008	0.008	0.008	1	0.008	0.0001
17	43.794	780.0	cis-1,3-dimethylcyclohexane	0.323	0.331	0.327	1	0.327	0.0025
18	44	782.0	trans-1,4-dimethylcyclohexane	0.118	0.121	0.119	1	0.119	0.0009
19	44.385	785.6	OTHER C8	0.008	0.006	0.007	1	0.007	0.0001
20	44.693	788.4	1,1-dimethylcyclohexane	0.032	0.015	0.023	1	0.023	0.0002
21	44.833	789.8	cis-1-ethyl-3-methylcyclopentane	0.015	0.015	0.015	1	0.015	0.0001
22	45.087	792.1	trans-1-ethyl-3-methylcyclopentane	0.016	0.029	0.023	1	0.023	0.0002
23	45.227	793.4	cis-1-ethyl-2-methylcyclopentane	0.032	0.052	0.042	1	0.042	0.0003
24	45.429	795.3	butyl acetate	0.061	0.005	0.033	0.61	0.054	0.0004
25	45.929	800.0	octane	0.645	0.661	0.653	1	0.653	0.0050
26	46.35	804.2	cis-1,4-dimethylcyclohexane	0.017	0.015	0.016	1	0.016	0.0001
27	46.629	807.1	trans-1,3-dimethylcyclohexane	0.149	0.149	0.149	1	0.149	0.0011

Table A1. Sample #1 (Semi Gloss Lacquer) (Continued).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Res Factor	Adjusted Area	Fraction
28	48.028	821.2	2,2,5-trimethylhexane	0.026	0.013	0.019	1	0.019	0.0001
29	48.438	825.3	2,4-dimethylheptane	0.039	0.004	0.022	1	0.022	0.0002
30	49.069	831.7	cis-1,2-dimethylcyclohexane	0.074	0.008	0.041	1	0.041	0.0003
31	49.103	832.0	2,6-dimethylheptane	0.046	0.030	0.038	1	0.038	0.0003
32	49.464	835.7	cis, cis-1,3,5-trimethylcyclohexane	0.107	0.100	0.103	1	0.103	0.0008
33	49.577	836.8	ethylcyclohexane	0.179	0.191	0.185	1	0.185	0.0014
34	49.766	838.7	2,5-dimethylheptane	0.047	0.055	0.051	1	0.051	0.0004
35	50.125	842.3	1,1,3-trimethylcyclohexane	0.111	0.114	0.113	1	0.113	0.0009
36	50.416	845.3	1,1,4-trimethylcyclohexane	0.02	0.023	0.022	1	0.022	0.0002
37	50.674	847.9	OTHER C9	0.012	0.010	0.011	1	0.011	0.0001
38	51.27	853.9	ethylbenzene	4.258	4.302	4.280	1	4.280	0.0329
39	51.65	857.7	trans, trans-1,2,4-trimethylcyclohexane	0.227	0.233	0.230	1	0.230	0.0018
40	52.124	862.5	m-xylene	11.259	11.451	11.355	1	11.355	0.0873
41	52.224	863.5	p-xylene	4.246	4.100	4.173	1	4.173	0.0321
42	52.568	867.0	4-methyloctane	0.08	0.103	0.091	1	0.091	0.0007
43	53.258	874.0	3-methyloctane	0.048	0.014	0.031	1	0.031	0.0002
44	54.034	881.8	trans, cis-1,2,4-trimethylcyclohexane	0.137	0.018	0.077	1	0.077	0.0006
45	54.405	885.5	o-xylene	2.61	2.618	2.614	1	2.614	0.0201
46	54.678	888.3	cis, trans-1,2,4-trimethylcyclohexane	0.059	0.075	0.067	1	0.067	0.0005
47	55.068	892.2	cis-1-ethyl-3-methylcyclohexane	0.061	0.067	0.064	1	0.064	0.0005
48	55.324	894.8	cis, cis-1,2,4-trimethylcyclohexane	0.027	0.028	0.028	1	0.028	0.0002
49	55.838	900.0	isobutyl isobutyrate	12.981	13.556	13.269	0.67	19.804	0.1522
50	56.385	906.1	trans-1-ethyl-2-methylcyclohexane	0.008	0.012	0.010	1	0.010	0.0001
51	56.731	910.0	cis, trans-1,2,3-trimethylcyclohexane	0.017	0.018	0.017	1	0.017	0.0001
52	56.948	912.4	trans-1-ethyl-4-methylcyclohexane	0.028	0.035	0.031	1	0.031	0.0002
53	58.196	926.3	isopropylcyclohexane	0.013	0.008	0.011	1	0.011	0.0001
				99.975	100.000	99.988		130.107	1.0000
							Fraction Identified=		0.9999

Table A2. Sample #2 (Fast Sanding Sealer).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Res Factor	Adjusted Area	Fraction
1	17.435	474.7	acetone	12.731	12.715	12.723	0.515	24.705	0.1860
2	17.872	485.9	isopropyl alcohol	11.395	10.971	11.183	0.54	20.709	0.1559
3	23.352	572.1	methyl ethyl ketone	9.736	9.530	9.633	0.63	15.291	0.1151
4	26.565	612.9	isobutyl alcohol	1.890	1.895	1.893	0.68	2.784	0.0210
5	29.889	645.9	butyl alcohol	2.594	2.598	2.596	0.7	3.708	0.0279
6	37.613	721.2	methyl isobutyl ketone	10.683	10.545	10.614	0.75	14.152	0.1066
7	41.506	757.6	toluene	25.147	25.156	25.151	1	25.151	0.1894
8	41.976	762.0	2,3-dimethylhexane	0.032	0.032	0.032	1	0.032	0.0002
9	42.194	764.0	3-ethyl-2-methylpentane	0.007	0.000	0.004	1	0.004	0.0000
10	42.501	766.9	2-methylheptane	0.276	0.292	0.284	1	0.284	0.0021
11	42.686	768.6	4-methylheptane	0.069	0.076	0.073	1	0.073	0.0005
12	43	771.6	3,4-dimethylhexane	0.016	0.016	0.016	1	0.016	0.0001
13	43.33	774.6	3-methylheptane	0.177	0.185	0.181	1	0.181	0.0014
14	43.489	776.1	3-ethylhexane	0.026	0.031	0.029	1	0.029	0.0002
15	43.916	780.1	cis-1,3-dimethylcyclohexane	0.338	0.360	0.349	1	0.349	0.0026
16	44.122	782.0	trans-1,4-dimethylcyclohexane	0.123	0.132	0.127	1	0.127	0.0010
17	44.818	788.5	1,1-dimethylcyclohexane	0.030	0.036	0.033	1	0.033	0.0002
18	44.96	789.9	cis-1-ethyl-3-methylcyclopentane	0.013	0.015	0.014	1	0.014	0.0001
19	45.211	792.2	trans-1-ethyl-3-methylcyclopentane	0.012	0.014	0.013	1	0.013	0.0001
20	45.353	793.5	cis-1-ethyl-2-methylcyclopentane	0.031	0.027	0.029	1	0.029	0.0002
21	45.55	795.4	butyl acetate	0.152	0.158	0.155	0.61	0.254	0.0019
22	46.044	800.0	octane	0.685	0.689	0.687	1	0.687	0.0052
23	46.455	804.2	cis-1,4-dimethylcyclohexane	0.013	0.014	0.014	1	0.014	0.0001
24	46.748	807.1	trans-1,3-dimethylcyclohexane	0.155	0.156	0.155	1	0.155	0.0012

Table A2. Sample #2 (Fast Sanding Sealer) (Continued).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Res Factor	Adjusted Area	Fraction
25	47.468	814.4	1-ethyl-1-methylcyclopentane	0.011	0.013	0.012	1	0.012	0.0001
26	48.152	821.3	2,2,5-trimethylhexane	0.019	0.026	0.023	1	0.023	0.0002
27	48.55	825.3	2,4-dimethylheptane	0.046	0.042	0.044	1	0.044	0.0003
28	49.175	831.7	cis-1,2-dimethylcyclohexane	0.123	0.096	0.109	1	0.109	0.0008
29	49.578	835.7	cis, cis-1,3,5-trimethylcyclohexane	0.092	0.039	0.066	1	0.066	0.0005
30	49.688	836.9	ethylcyclohexane	0.168	0.005	0.087	1	0.087	0.0007
31	49.868	838.7	2,5-dimethylheptane	0.049	0.118	0.083	1	0.083	0.0006
32	50.242	842.5	1,1,3-trimethylcyclohexane	0.097	0.181	0.139	1	0.139	0.0010
33	51.375	853.9	ethylbenzene	3.690	3.758	3.724	1	3.724	0.0280
34	51.761	857.8	trans, trans-1,2,4-trimethylcyclohexane	0.253	0.264	0.258	1	0.258	0.0019
35	52.22	862.5	m-xylene	10.929	11.289	11.109	1	11.109	0.0836
36	52.319	863.5	p-xylene	3.648	3.873	3.761	1	3.761	0.0283
37	52.68	867.1	4-methyloctane	0.109	0.119	0.114	1	0.114	0.0009
38	53.368	874.1	3-methyloctane	0.049	0.054	0.052	1	0.052	0.0004
39	54.153	882.0	trans, cis-1,2,4-trimethylcyclohexane	0.134	0.132	0.133	1	0.133	0.0010
40	54.514	885.7	o-xylene	4.015	4.093	4.054	1	4.054	0.0305
41	54.769	888.3	cis, trans-1,2,4-trimethylcyclohexane	0.033	0.053	0.043	1	0.043	0.0003
42	55.178	892.4	cis-1-ethyl-3-methylcyclohexane	0.048	0.061	0.055	1	0.055	0.0004
43	55.423	894.9	cis, cis-1,2,4-trimethylcyclohexane	0.024	0.027	0.026	1	0.026	0.0002
44	55.93	900.0	nonane	0.080	0.058	0.069	1	0.069	0.0005
45	57.573	916.6	2,4-dimethyloctane	0.052	0.054	0.053	1	0.053	0.0004
				100.000	100.000	100.000		132.806	1.0000

Fraction Identified = 1.0000

Table A3. Sample #3 (Low VOC Wiping Stain; Dark).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Res Factor	Adjusted Area	Fraction
1	16.846	438.0	ethanol	0.104	0.125	0.115	0.46	0.249	0.0018
2	45.195	780.3	cis-1,3-dimethylcyclohexane	0.229	0.198	0.214	1	0.214	0.0015
3	45.415	782.3	trans-1,4-dimethylcyclohexane	0.069	0.064	0.066	1	0.066	0.0005
4	47.306	800.0	octane	0.385	0.359	0.372	1	0.372	0.0027
5	48.03	807.3	cis-1,4-dimethylcyclohexane	0.148	0.130	0.139	1	0.139	0.0010
6	49.784	825.2	2,4-dimethylheptane	0.089	0.045	0.067	1	0.067	0.0005
7	50.092	828.3	OTHER C9	0.084	0.096	0.090	1	0.090	0.0006
8	50.412	831.5	cis-1,2-dimethylcyclohexane	0.255	0.187	0.221	1	0.221	0.0016
9	50.957	837.1	ethylcyclohexane	0.307	0.215	0.261	1	0.261	0.0019
10	51.11	838.6	2,5-dimethylheptane	0.077	0.000	0.039	1	0.039	0.0003
11	51.506	842.6	1,1,3-trimethylcyclohexane	0.313	0.250	0.281	1	0.281	0.0020
12	52.624	854.0	ethylbenzene	0.455	0.412	0.434	1	0.434	0.0031
13	53.018	858.0	trans, trans-1,2,4-trimethylcyclohexane	0.287	0.272	0.279	1	0.279	0.0020
14	53.195	859.8	2,3-dimethylheptane	0.167	0.125	0.146	1	0.146	0.0010
15	53.44	862.3	m-xylene	1.12	1.157	1.138	1	1.138	0.0081
16	53.546	863.3	p-xylene	0.398	0.378	0.388	1	0.388	0.0028
17	53.897	866.9	4-methyloctane	0.656	0.631	0.644	1	0.644	0.0046
18	54.591	873.9	3-methyloctane	0.582	0.554	0.568	1	0.568	0.0040
19	55.385	882.0	trans, cis-1,2,4-trimethylcyclohexane	0.294	0.274	0.284	1	0.284	0.0020
20	55.756	885.8	o-xylene	0.833	0.806	0.820	1	0.820	0.0058
21	56.101	889.3	1,2,3-trimethylcyclohexane	0.264	0.315	0.289	1	0.289	0.0021
22	56.421	892.5	cis-1-ethyl-3-methylcyclohexane	0.409	0.442	0.426	1	0.426	0.0030
23	56.678	895.1	trans-1-ethyl-3-methylcyclohexane	0.179	0.215	0.197	1	0.197	0.0014
24	57.158	900.0	nonane	1.982	1.906	1.944	1	1.944	0.0139
25	57.761	906.8	trans-1-ethyl-2-methylcyclohexane	0.093	0.071	0.082	1	0.082	0.0006

Table A3. Sample #3 (Low VOC Wiping Stain; Dark) (Continued).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Res Factor	Adjusted Area	Fraction
26	58.093	910.5	cis, trans-1,2,3-trimethylcyclohexane	0.132	0.137	0.135	1	0.135	0.0010
27	58.318	913.0	trans-1-ethyl-4-methylcyclohexane	0.517	0.509	0.513	1	0.513	0.0037
28	58.571	915.8	cis-1-ethyl-4-methylcyclohexane	0.09	0.112	0.101	1	0.101	0.0007
29	58.805	918.5	isopropylbenzene	0.078	0.094	0.086	1	0.086	0.0006
30	59.008	920.7	3,4-dimethyloctane	0.154	0.155	0.155	1	0.155	0.0011
31	59.607	927.4	1-butoxy-2-propanol	51.604	50.340	50.972	0.58	87.882	0.6267
32	60.483	937.3	2,6-dimethyloctane	1.17	1.283	1.227	1	1.227	0.0087
33	60.83	941.1	2-butoxy-1-propanol	1.998	1.978	1.988	0.58	3.428	0.0244
34	61.308	946.5	3-ethyl-2-methylheptane	0.497	0.502	0.499	1	0.499	0.0036
35	61.55	949.2	propylbenzene	0.288	0.294	0.291	1	0.291	0.0021
36	62.166	956.1	1-ethyl-3-methylbenzene	0.628	0.694	0.661	1	0.661	0.0047
37	62.379	958.5	1-ethyl-4-methylbenzene	0.619	0.715	0.667	1	0.667	0.0048
38	62.717	962.3	1,3,5-trimethylbenzene	0.316	0.327	0.321	1	0.321	0.0023
39	62.871	964.0	4-methylnonane	1.079	1.093	1.086	1	1.086	0.0077
40	63.088	966.4	2-methylnonane	0.475	0.630	0.553	1	0.553	0.0039
41	63.281	968.6	1-ethyl-1,3-dimethylcyclohexane	0.243	0.430	0.337	1	0.337	0.0024
42	63.467	970.7	3-methylnonane	0.2	0.224	0.212	1	0.212	0.0015
43	63.707	973.4	1-ethyl-2-methylbenzene	0.556	0.637	0.597	1	0.597	0.0043
44	63.871	975.2	OTHER C10	0.155	0.279	0.217	1	0.217	0.0015
45	64.423	981.4	1-methyl-3-isopropylcyclohexane	0.302	0.319	0.310	1	0.310	0.0022
46	64.658	984.0	2-ethyl-1,3-dimethylcyclohexane	0.197	0.246	0.221	1	0.221	0.0016
47	65.183	989.9	1,2,4-trimethylbenzene	1.83	1.894	1.862	1	1.862	0.0133
48	65.55	994.0	1-methyl-2-isopropylcyclohexane	0.309	0.401	0.355	1	0.355	0.0025
49	66.083	1000.0	decane	4.515	4.296	4.406	1	4.406	0.0314
50	66.34	1003.1	methyl propylcyclohexane	0.154	0.000	0.077	1	0.077	0.0005

Table A3. Sample #3 (Low VOC Wiping Stain; Dark) (Continued).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Res Factor	Adjusted Area	Fraction
51	66.553	1005.7	diethylcyclohexane	0.233	0.245	0.239	1	0.239	0.0017
52	66.745	1008.0	methyl propylcyclohexane	0.169	0.158	0.164	1	0.164	0.0012
53	66.915	1010.1	diethylcyclohexane	0.087	0.000	0.044	1	0.044	0.0003
54	67.158	1013.1	2,4-dimethylnonane	0.079	0.000	0.040	1	0.040	0.0003
55	67.483	1017.0	2,5-dimethylnonane	0.314	0.394	0.354	1	0.354	0.0025
56	67.712	1019.8	1,2,3-trimethylbenzene	0.435	0.517	0.476	1	0.476	0.0034
57	67.897	1022.0	3,5-dimethylnonane	0.362	0.394	0.378	1	0.378	0.0027
58	68.192	1025.6	2,6-dimethylnonane	1.136	1.163	1.149	1	1.149	0.0082
59	68.627	1030.9	5-ethyl-3-methyloctane	0.443	0.594	0.519	1	0.519	0.0037
60	68.93	1034.6	isobutylcyclohexane	0.064	0.000	0.032	1	0.032	0.0002
61	69.005	1035.5	2,7-dimethylnonane	0.054	0.000	0.027	1	0.027	0.0002
62	69.2	1037.9	butylcyclohexane	0.212	0.361	0.287	1	0.287	0.0020
63	69.426	1040.6	pentylcyclopentane	0.606	0.749	0.677	1	0.677	0.0048
64	69.608	1042.8	3,7-dimethylnonane	0.446	0.572	0.509	1	0.509	0.0036
65	70.028	1047.9	1-methyl-3-propylbenzene	0.325	0.380	0.353	1	0.353	0.0025
66	70.508	1053.8	3-ethylnonane	0.562	0.700	0.631	1	0.631	0.0045
67	70.962	1059.3	5-methyldecane	0.59	0.721	0.655	1	0.655	0.0047
68	71.224	1062.5	4-methyldecane	0.619	0.796	0.707	1	0.707	0.0050
69	71.505	1065.9	trans-decalin	0.875	0.876	0.876	1	0.876	0.0062
70	71.791	1069.4	1,4-dimethyl-2-ethylbenzene	0.166	0.187	0.177	1	0.177	0.0013
71	72.07	1072.8	3-methyldecane	1.135	1.247	1.191	1	1.191	0.0085
72	72.38	1076.5	1,3-dimethyl-4-ethylbenzene	0.061	0.144	0.103	1	0.103	0.0007
73	72.889	1082.7	1-methylindane	0.307	0.333	0.320	1	0.320	0.0023
74	73.277	1087.4	ethyl propylcyclohexane	0.132	0.119	0.126	1	0.126	0.0009
75	73.754	1093.2	cis-decalin	0.419	0.485	0.452	1	0.452	0.0032

Table A3. Sample #3 (Low VOC Wiping Stain; Dark) (Continued).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Res Factor	Adjusted Area	Fraction
76	74.311	1100.0	undecane	4.524	4.323	4.424	1	4.424	0.0315
77	74.759	1105.7	1,2-dimethyl-3-ethylbenzene	0.18	0.112	0.146	1	0.146	0.0010
78	74.906	1107.6	2-methyldecalin	0.252	0.261	0.256	1	0.256	0.0018
79	75.143	1110.6	4,6-dimethyldecane	0.323	0.217	0.270	1	0.270	0.0019
80	75.902	1120.2	2,6-dimethyldecane	0.496	0.594	0.545	1	0.545	0.0039
81	76.328	1125.6	2-methyldecalin	0.178	0.236	0.207	1	0.207	0.0015
82	76.724	1130.6	3,7-dimethyldecane	0.636	0.585	0.611	1	0.611	0.0044
83	77.061	1134.9	2,7-dimethyldecane	0.066	0.045	0.055	1	0.055	0.0004
84	77.203	1136.7	1-ethyl-3-isopropylbenzene	0.072	0.080	0.076	1	0.076	0.0005
85	77.571	1141.4	OTHER C12	0.111	0.105	0.108	1	0.108	0.0008
86	77.903	1145.6	pentylcyclohexane	0.383	0.406	0.395	1	0.395	0.0028
87	78.186	1149.2	1-butyl-3-methylbenzene	0.174	0.206	0.190	1	0.190	0.0014
88	78.72	1156.0	5-methylundecane	0.534	0.500	0.517	1	0.517	0.0037
89	79.131	1161.2	4-methylundecane	0.261	0.237	0.249	1	0.249	0.0018
90	79.459	1165.3	1,2,3,4-tetramethylbenzene	0.303	0.310	0.306	1	0.306	0.0022
91	80.022	1172.5	3-methylundecane	0.297	0.256	0.276	1	0.276	0.0020
92	82.19	1200.0	dodecane	0.907	0.867	0.887	1	0.887	0.0063
93	84.344	1227.1	2-(2-ethylhexyl)ethanol	2.652	2.708	2.680	0.61	4.394	0.0313
				100.065	100.000	100.033		140.231	1.0000
						Fraction Identified			0.9970

Table A4. Sample #4 (Light Wiping Stain).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Reponse Factor	Adjusted Area	Fraction
1	16.672	442.6	ethanol	0.379	0.366	0.373	0.46	0.810	0.0060
2	18.23	481.4	2-propanol	0.042	0.049	0.046	0.54	0.084	0.0006
3	42.93	766.9	2-methylheptane	0.066	0.067	0.067	1	0.067	0.0005
4	43.135	768.4	4-methylheptane	0.016	0.019	0.018	1	0.018	0.0001
5	43.768	774.6	3-methylheptane	0.049	0.052	0.051	1	0.051	0.0004
6	44.355	780.1	cis-1,3-dimethylcyclohexane	0.378	0.364	0.371	1	0.371	0.0028
7	44.558	782.1	trans-1,4-dimethylcyclohexane	0.127	0.123	0.125	1	0.125	0.0009
8	45.261	788.5	1,1-dimethylcyclohexane	0.04	0.028	0.034	1	0.034	0.0003
9	45.386	789.9	cis-1-ethyl-3-methylcyclopentane	0.021	0.019	0.020	1	0.020	0.0001
10	45.652	792.1	trans-1-ethyl-3-methylcyclopentane	0.013	0.013	0.013	1	0.013	0.0001
11	45.78	793.7	cis-1-ethyl-2-methylcyclopentane	0.115	0.035	0.075	1	0.075	0.0006
12	46.479	800.0	octane	0.639	0.63	0.635	1	0.635	0.0047
13	46.898	804.3	trans-1,3-dimethylcyclohexane	0.028	0.024	0.026	1	0.026	0.0002
14	47.193	807.1	cis-1,4-dimethylcyclohexane	0.207	0.2	0.204	1	0.204	0.0015
15	47.883	814.2	1-ethyl-1-methylcyclopentane	0.021	0.021	0.021	1	0.021	0.0002
16	48.339	818.8	OTHER C9	0.012	0.012	0.012	1	0.012	0.0001
17	48.587	820.2	2,2-dimethylheptane	0.009	0.027	0.018	1	0.018	0.0001
18	49.253	827.9	OTHER C9	0.11	0.103	0.107	1	0.107	0.0008
19	49.606	831.6	cis-1,2-dimethylcyclohexane	0.351	0.275	0.313	1	0.313	0.0023
20	50.013	835.7	cis, cis-1,3,5-trimethylcyclohexane	0.175	0.174	0.175	1	0.175	0.0013
21	50.139	836.9	ethylcyclohexane	0.333	0.322	0.328	1	0.328	0.0024
22	50.312	838.6	2,5-dimethylheptane	0.11	0.095	0.103	1	0.103	0.0008
23	50.686	840.4	OTHER C9	0.017	0.427	0.222	1	0.222	0.0017
24	50.975	845.2	1,1,4-trimethylcyclohexane	0.064	0.046	0.055	1	0.055	0.0004
25	51.087	846.4	OTHER C9	0.016	0.013	0.015	1	0.015	0.0001

Table A4. Sample #4 (Light Wiping Stain) (Continued).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Reponse Factor	Adjusted Area	Fraction
26	51.238	848.0	2,6-dimethylheptane	0.044	0.036	0.040	1	0.040	0.0003
27	51.811	853.8	ethylbenzene	0.761	0.748	0.755	1	0.755	0.0056
28	52.201	857.7	trans, trans-1,2,4-trimethylcyclohexan	0.566	0.551	0.559	1	0.559	0.0042
29	52.404	859.8	2,3-dimethylheptane	0.273	0.206	0.240	1	0.240	0.0018
30	52.632	862.1	m-xylene	1.506	1.551	1.529	1	1.529	0.0114
31	52.738	863.2	p-xylene	0.548	0.526	0.537	1	0.537	0.0040
32	53.051	866.9	4-methyloctane	0.27	0.27	0.270	1	0.270	0.0020
33	53.107	866.9	2-methyloctane	0.28	0.27	0.275	1	0.275	0.0021
34	53.803	873.9	3-methyloctane	0.487	0.519	0.503	1	0.503	0.0038
35	54.096	876.3	1,2,3-trimethylcyclohexane	0.024	0.088	0.056	1	0.056	0.0004
36	54.551	881.4	trans, cis-1,2,4-trimethylcyclohexane	0.583	0.543	0.563	1	0.563	0.0042
37	54.95	885.5	o-xylene	0.973	0.953	0.963	1	0.963	0.0072
38	55.316	889.2	1,2,3-trimethylcyclohexane	0.439	0.429	0.434	1	0.434	0.0032
39	55.616	892.2	cis-1-ethyl-3-methylcyclohexane	0.541	0.538	0.540	1	0.540	0.0040
40	55.873	894.7	trans-1-ethyl-3-methylcyclohexane	0.332	0.338	0.335	1	0.335	0.0025
41	56.166	897.9	cis, cis-1,2,4-trimethylcyclohexane	0.208	0.189	0.199	1	0.199	0.0015
42	56.385	900.0	nonane	1.802	1.816	1.809	1	1.809	0.0135
43	56.971	906.5	trans-1-ethyl-2-methylcyclohexane	0.277	0.27	0.274	1	0.274	0.0020
44	57.3	910.1	cis, trans-1,2,3-trimethylcyclohexane	0.268	0.278	0.273	1	0.273	0.0020
45	57.531	912.7	trans-1-ethyl-4-methylcyclohexane	0.728	0.752	0.740	1	0.740	0.0055
46	57.775	915.5	cis-1-ethyl-4-methylcyclohexane	0.13	0.152	0.141	1	0.141	0.0011
47	58.021	918.3	isopropylbenzene	0.13	0.168	0.149	1	0.149	0.0011
48	58.232	920.6	3,4-dimethyloctane	0.149	0.194	0.172	1	0.172	0.0013
49	58.895	929.4	1-butoxy-2-propanol	44.452	44.108	44.280	0.58	76.345	0.5697
50	59.267	932.4	cis-1-ethyl-2-methylcyclohexane	0.175	0.222	0.199	1	0.199	0.0015

Table A4. Sample #4 (Light Wiping Stain) (Continued).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Reponse Factor	Adjusted Area	Fraction
51	59.614	936.1	propylcyclohexane	0.932	0.968	0.950	1	0.950	0.0071
52	59.729	937.5	2,6-dimethyloctane	0.921	0.959	0.940	1	0.940	0.0070
53	60.069	941.6	2-butoxy-1-propanol	1.828	1.98	1.904	0.58	3.283	0.0245
54	60.243	943.2	3,6-dimethyloctane	0.193	0.233	0.213	1	0.213	0.0016
55	60.541	946.5	3-ethyl-2-methylheptane	0.578	0.613	0.596	1	0.596	0.0044
56	60.774	949.1	propylbenzene	0.558	0.601	0.580	1	0.580	0.0043
57	61.105	952.8	4-ethyloctane	0.215	0.239	0.227	1	0.227	0.0017
58	61.385	956.0	1-ethyl-3-methylbenzene	0.821	0.834	0.828	1	0.828	0.0062
59	61.608	958.4	1-ethyl-4-methylbenzene	0.746	0.772	0.759	1	0.759	0.0057
60	61.946	962.1	1,3,5-trimethylbenzene	0.298	0.313	0.306	1	0.306	0.0023
61	62.104	963.9	4-methylnonane	1.047	1.055	1.051	1	1.051	0.0078
62	62.333	966.5	2-methylnonane	0.493	0.498	0.496	1	0.496	0.0037
63	62.481	968.2	1-ethyl-1,3-dimethylcyclohexane	0.941	0.945	0.943	1	0.943	0.0070
64	62.674	970.4	3-methylnonane	0.332	0.339	0.336	1	0.336	0.0025
65	62.949	973.4	1-ethyl-2-methylbenzene	0.496	0.492	0.494	1	0.494	0.0037
66	63.084	974.9	OTHER C10	0.338	0.338	0.338	1	0.338	0.0025
67	63.328	977.5	1-methyl-4-isopropylcyclohexane	0.242	0.247	0.245	1	0.245	0.0018
68	63.634	981.0	1-methyl-3-isopropylcyclohexane	0.526	0.528	0.527	1	0.527	0.0039
69	63.887	983.8	2-ethyl-1,3-dimethylcyclohexane	0.529	0.532	0.531	1	0.531	0.0040
70	64.009	985.1	2-ethyl-1,3-dimethylcyclohexane	0.28	0.271	0.276	1	0.276	0.0021
71	64.186	987.2	diethylcyclohexane	0.237	0.238	0.238	1	0.238	0.0018
72	64.411	989.7	1,2,4-trimethylbenzene	1.695	1.684	1.690	1	1.690	0.0126
73	64.796	993.9	1-methyl-2-isopropylcyclohexane	0.582	0.593	0.588	1	0.588	0.0044
74	65.016	996.4	methyl isopropylcyclohexane	0.29	0.3	0.295	1	0.295	0.0022
75	65.135	997.6	diethylcyclohexane	0.286	0.259	0.273	1	0.273	0.0020

Table A4. Sample #4 (Light Wiping Stain) (Continued).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Reponse Factor	Adjusted Area	Fraction
76	65.33	1000.0	decane	2.824	2.823	2.824	1	2.824	0.0211
77	65.577	1002.8	methyl propylcyclohexane	0.209	0.206	0.208	1	0.208	0.0015
78	65.771	1005.3	diethylcyclohexane	0.375	0.376	0.376	1	0.376	0.0028
79	65.984	1007.9	methyl propylcyclohexane	0.306	0.305	0.306	1	0.306	0.0023
80	66.398	1013.0	2,4-dimethylnonane	0.067	0.066	0.067	1	0.067	0.0005
81	66.546	1014.6	1-methyl-3-isopropylbenzene	0.158	0.149	0.154	1	0.154	0.0011
82	66.709	1016.6	2,5-dimethylnonane	0.335	0.349	0.342	1	0.342	0.0026
83	66.941	1019.5	1,2,3-trimethylbenzene	0.869	0.858	0.864	1	0.864	0.0064
84	67.106	1021.5	3,5-dimethylnonane	0.442	0.437	0.440	1	0.440	0.0033
85	67.441	1025.6	2,6-dimethylnonane	1.071	1.059	1.065	1	1.065	0.0079
86	67.853	1030.7	5-ethyl-3-methyloctane	0.427	0.552	0.490	1	0.490	0.0037
87	68.253	1035.8	2,7-dimethylnonane	0.492	0.487	0.490	1	0.490	0.0037
88	68.466	1038.0	butylcyclohexane	0.327	0.33	0.329	1	0.329	0.0025
89	68.651	1040.3	pentylcyclopentane	0.548	0.542	0.545	1	0.545	0.0041
90	68.846	1042.7	3,7-dimethylnonane	0.47	0.468	0.469	1	0.469	0.0035
91	69.037	1045.0	1-methyl-3-propylbenzene	0.197	0.202	0.200	1	0.200	0.0015
92	69.255	1047.7	4-ethylnonane	0.43	0.41	0.420	1	0.420	0.0031
93	69.709	1053.0	3-ethylnonane	0.758	0.722	0.740	1	0.740	0.0055
94	70.213	1059.3	5-methyldecane	0.416	0.409	0.413	1	0.413	0.0031
95	70.456	1062.4	4-methyldecane	0.586	0.575	0.581	1	0.581	0.0043
96	70.747	1065.8	trans-decalin	0.477	0.479	0.478	1	0.478	0.0036
97	71.025	1069.3	OTHER C11	0.162	0.168	0.165	1	0.165	0.0012
98	71.2	1071.3	1,4-dimethyl-2-ethylbenzene	0.448	0.424	0.436	1	0.436	0.0033
99	71.323	1072.8	3-methyldecane	0.673	0.67	0.672	1	0.672	0.0050
100	71.615	1076.6	1,3-dimethyl-4-ethylbenzene	0.118	0.108	0.113	1	0.113	0.0008

Table A4. Sample #4 (Light Wiping Stain) (Continued).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Reponse Factor	Adjusted Area	Fraction
101	71.818	1078.9	ethyl propylcyclohexane	0.178	0.132	0.155	1	0.155	0.0012
102	72.096	1082.2	1-methylindane	0.424	0.428	0.426	1	0.426	0.0032
103	72.475	1086.8	ethyl propylcyclohexane	0.313	0.294	0.304	1	0.304	0.0023
104	72.773	1090.5	ethyl propylcyclohexane	0.182	0.165	0.174	1	0.174	0.0013
105	72.978	1093.1	cis-decalin	0.605	0.603	0.604	1	0.604	0.0045
106	73.55	1100.0	undecane	1.919	2.129	2.024	1	2.024	0.0151
107	74.124	1107.2	2-methyldecalin	0.521	0.524	0.523	1	0.523	0.0039
108	74.304	1109.5	4,6-dimethyldecane	0.269	0.269	0.269	1	0.269	0.0020
109	74.559	1112.8	OTHER C12	0.09	0.063	0.077	1	0.077	0.0006
110	74.908	1117.2	1,2,4,5-tetramethylbenzene	0.188	0.112	0.150	1	0.150	0.0011
111	75.131	1120.2	2,6-dimethyldecane	0.44	0.364	0.402	1	0.402	0.0030
112	75.57	1124.8	2-methyldecalin	0.154	0.175	0.165	1	0.165	0.0012
113	75.945	1130.6	3,7-dimethyldecane	0.542	0.542	0.542	1	0.542	0.0040
114	76.259	1134.1	2,7-dimethyldecane	0.039	0.041	0.040	1	0.040	0.0003
115	76.46	1136.9	1-ethyl-3-isopropylbenzene	0.029	0.032	0.031	1	0.031	0.0002
116	76.766	1141.2	OTHER C12	0.135	0.123	0.129	1	0.129	0.0010
117	77.103	1145.4	pentylcyclohexane	0.283	0.286	0.285	1	0.285	0.0021
118	77.357	1148.6	1-butyl-3-methylbenzene	0.37	0.362	0.366	1	0.366	0.0027
119	77.899	1155.6	5-methylundecane	0.405	0.415	0.410	1	0.410	0.0031
120	78.353	1161.2	4-methylundecane	0.184	0.185	0.185	1	0.185	0.0014
121	78.676	1165.5	1,2,3,4-tetramethylbenzene	0.389	0.393	0.391	1	0.391	0.0029
122	79.234	1172.5	3-methylundecane	0.23	0.229	0.230	1	0.230	0.0017
123	79.783	1179.6	3,8-dimethyldecane	0.042	0.053	0.048	1	0.048	0.0004
124	80.077	1182.9	methyl pentylcyclohexane	0.049	0.051	0.050	1	0.050	0.0004
125	80.547	1188.9	naphthalene	0.093	0.076	0.085	1	0.085	0.0006

Table A4. Sample #4 (Light Wiping Stain) (Continued).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Reponse Factor	Adjusted Area	Fraction
126	80.852	1193.2	5,6-dimethylindane	0.065	0.058	0.062	1	0.062	0.0005
127	81.042	1195.6	OTHER C12	0.066	0.073	0.070	1	0.070	0.0005
128	81.377	1200.0	dodecane	0.745	0.769	0.757	1	0.757	0.0056
129	81.589	1202.7	OTHER C13	0.107	0.105	0.106	1	0.106	0.0008
130	81.829	1205.8	OTHER C13	0.247	0.029	0.138	1	0.138	0.0010
131	82.168	1210.1	2,4-dimethylundecane	0.06	0.071	0.066	1	0.066	0.0005
132	82.645	1215.8	2,6-dimethylundecane	0.315	0.324	0.320	1	0.320	0.0024
133	83.492	1226.5	2-(2-ethylhexyl)ethanol	1.453	1.415	1.434	0.61	2.351	0.0175
134	84.936	1244.5	hexylcyclohexane	0.045	0.049	0.047	1	0.047	0.0004
135	85.327	1248.9	2,9-dimethylundecane	0.072	0.072	0.072	1	0.072	0.0005
				99.121	99.235	99.178		134.014	1.0000
						Fraction Identified			0.9897

Table A5. Sample #5 (One Step Oil Stain).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Reponse Factor	Adjusted Area	Fraction
1	49.015	828.0	OTHER C9	0.126	0.134	0.130	1	0.130	0.0009
2	49.364	831.5	cis-1,2-dimethylcyclohexane	0.054	0.044	0.049	1	0.049	0.0003
3	49.78	835.7	cis, cis-1,3,5-trimethylcyclohexane	0.116	0.067	0.091	1	0.091	0.0006
4	50.064	838.5	2,5-dimethylheptane	0.022	0.026	0.024	1	0.024	0.0002
5	50.441	842.3	1,1,3-trimethylcyclohexane	0.128	0.121	0.125	1	0.125	0.0009
6	50.621	844.2	1,1,4-trimethylcyclohexane	0.352	0.311	0.331	1	0.331	0.0023
7	51.56	853.6	ethylbenzene	0.133	0.117	0.125	1	0.125	0.0009
8	51.959	857.7	trans, trans-1,2,4-trimethylcyclohexane	0.290	0.286	0.288	1	0.288	0.0020
9	52.176	859.9	2,3-dimethylheptane	0.116	0.074	0.095	1	0.095	0.0007
10	52.396	862.1	m-xylene	0.346	0.336	0.341	1	0.341	0.0024
11	52.51	863.0	p-xylene	0.111	0.113	0.112	1	0.112	0.0008
12	52.865	866.8	4-methyloctane	0.265	0.275	0.270	1	0.270	0.0019
13	53.575	874.0	3-methyloctane	0.237	0.255	0.246	1	0.246	0.0017
14	53.869	877.0	1,2,3-trimethylcyclohexane	0.044	0.039	0.042	1	0.042	0.0003
15	54.318	881.5	trans, cis-1,2,4-trimethylcyclohexane	0.412	0.397	0.405	1	0.405	0.0028
16	54.704	885.4	o-xylene	0.378	0.373	0.376	1	0.376	0.0026
17	55.068	889.1	1,2,3-trimethylcyclohexane	0.277	0.205	0.241	1	0.241	0.0017
18	55.237	890.8	1,1,2-trimethylcyclohexane	0.095	0.094	0.094	1	0.094	0.0007
19	55.375	892.2	cis-1-ethyl-3-methylcyclohexane	0.378	0.384	0.381	1	0.381	0.0026
20	55.633	894.8	trans-1-ethyl-3-methylcyclohexane	0.226	0.251	0.238	1	0.238	0.0016
21	55.943	897.9	cis, cis-1,2,4-trimethylcyclohexane	0.165	0.145	0.155	1	0.155	0.0011
22	56.152	900.0	nonane	1.394	1.382	1.388	1	1.388	0.0096
23	56.743	906.6	trans-1-ethyl-2-methylcyclohexane	0.226	0.225	0.225	1	0.225	0.0016
24	57.06	910.1	cis, trans-1,2,3-trimethylcyclohexane	0.229	0.214	0.222	1	0.222	0.0015
25	57.293	912.7	trans-1-ethyl-4-methylcyclohexane	0.577	0.583	0.580	1	0.580	0.0040
26	57.534	915.4	cis-1-ethyl-4-methylcyclohexane	0.129	0.111	0.120	1	0.120	0.0008
27	57.794	918.3	isopropylbenzene	0.121	0.154	0.137	1	0.137	0.0009

Table A5. Sample #5 (One Step Oil Stain) (Continued).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Reponse Factor	Adjusted Area	Fraction
28	58.009	920.7	3,4-dimethyloctane	0.146	0.140	0.143	1	0.143	0.0010
29	58.634	927.7	1-butoxy-2-propanol	60.276	59.201	59.738	0.58	102.997	0.7103
30	59.377	936.0	propylcyclohexane	0.840	0.809	0.825	1	0.825	0.0057
31	59.499	937.4	2,6-dimethyloctane	0.780	0.850	0.815	1	0.815	0.0056
32	59.834	941.1	2-butoxy-1-propanol	2.228	2.424	2.326	0.58	4.010	0.0277
33	60.006	943.0	3,6-dimethyloctane	0.142	0.166	0.154	1	0.154	0.0011
34	60.309	946.4	3-ethyl-2-methylheptane	0.496	0.546	0.521	1	0.521	0.0036
35	60.536	949.0	propylbenzene	0.462	0.556	0.509	1	0.509	0.0035
36	60.879	952.8	4-ethyloctane	0.115	0.133	0.124	1	0.124	0.0009
37	61.152	955.8	1-ethyl-3-methylbenzene	0.849	0.916	0.882	1	0.882	0.0061
38	61.379	958.4	1-ethyl-4-methylbenzene	0.710	0.776	0.743	1	0.743	0.0051
39	61.78	962.9	1,3,5-trimethylbenzene	0.261	0.279	0.270	1	0.270	0.0019
40	61.873	963.9	4-methylnonane	0.890	1.069	0.980	1	0.980	0.0068
41	62.108	966.5	2-methylnonane	0.498	0.483	0.490	1	0.490	0.0034
42	62.244	968.0	1-ethyl-1,3-dimethylcyclohexane	0.840	0.837	0.838	1	0.838	0.0058
43	62.458	970.4	3-methylnonane	0.295	0.304	0.299	1	0.299	0.0021
44	62.726	973.4	1-ethyl-2-methylbenzene	0.493	0.484	0.488	1	0.488	0.0034
45	62.844	974.7	OTHER C10	0.304	0.359	0.331	1	0.331	0.0023
46	63.08	977.4	1-methyl-4-isopropylcyclohexane	0.196	0.191	0.193	1	0.193	0.0013
47	63.395	980.9	1-methyl-3-isopropylcyclohexane	0.458	0.469	0.464	1	0.464	0.0032
48	63.653	983.8	2-ethyl-1,3-dimethylcyclohexane	0.452	0.461	0.457	1	0.457	0.0031
49	63.771	985.1	2-ethyl-1,3-dimethylcyclohexane	0.245	0.248	0.246	1	0.246	0.0017
50	63.973	987.3	diethylcyclohexane	0.137	0.150	0.143	1	0.143	0.0010
51	64.175	989.6	1,2,4-trimethylbenzene	1.662	1.699	1.680	1	1.680	0.0116
52	64.562	993.9	1-methyl-2-isopropylcyclohexane	0.461	0.533	0.497	1	0.497	0.0034
53	64.891	997.6	diethylcyclohexane	0.212	0.267	0.239	1	0.239	0.0017
54	65.106	1000.0	decane	2.817	2.849	2.833	1	2.833	0.0195

Table A5. Sample #5 (One Step Oil Stain) (Continued).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Reponse Factor	Adjusted Area	Fraction
55	65.331	1002.7	methyl propylcyclohexane	0.148	0.152	0.150	1	0.150	0.0010
56	65.536	1005.2	diethylcyclohexane	0.272	0.333	0.303	1	0.303	0.0021
57	65.764	1008.0	methyl propylcyclohexane	0.213	0.277	0.245	1	0.245	0.0017
58	65.9	1009.7	diethylcyclohexane	0.074	0.073	0.073	1	0.073	0.0005
59	66.185	1013.1	2,4-dimethylnonane	0.075	0.068	0.071	1	0.071	0.0005
60	66.308	1014.6	1-methyl-3-isopropylbenzene	0.158	0.151	0.155	1	0.155	0.0011
61	66.497	1016.9	2,5-dimethylnonane	0.356	0.292	0.324	1	0.324	0.0022
62	66.71	1019.5	1,2,3-trimethylbenzene	0.717	0.789	0.753	1	0.753	0.0052
63	66.884	1021.6	3,5-dimethylnonane	0.296	0.376	0.336	1	0.336	0.0023
64	67.218	1025.7	2,6-dimethylnonane	0.872	0.995	0.933	1	0.933	0.0064
65	67.627	1030.7	5-ethyl-3-methyloctane	0.240	0.333	0.286	1	0.286	0.0020
66	68.031	1035.6	2,7-dimethylnonane	0.273	0.239	0.256	1	0.256	0.0018
67	68.229	1038.0	butylcyclohexane	0.199	0.296	0.248	1	0.248	0.0017
68	68.426	1040.4	pentylcyclopentane	0.396	0.524	0.460	1	0.460	0.0032
69	68.617	1042.7	3,7-dimethylnonane	0.351	0.417	0.384	1	0.384	0.0026
70	68.803	1045.0	1-methyl-3-propylbenzene	0.110	0.150	0.130	1	0.130	0.0009
71	69.022	1047.6	4-ethylnonane	0.342	0.366	0.354	1	0.354	0.0024
72	69.469	1053.1	3-ethylnonane	0.447	0.495	0.471	1	0.471	0.0032
73	69.602	1054.7	5-ethyl-2-methyloctane	0.129	0.118	0.124	1	0.124	0.0009
74	69.996	1059.5	5-methyldecane	0.284	0.090	0.187	1	0.187	0.0013
75	70.212	1062.1	4-methyldecane	0.262	0.394	0.328	1	0.328	0.0023
76	70.245	1062.5	OTHER C11	0.167	0.532	0.350	1	0.350	0.0024
77	70.529	1066.0	trans-decalin	0.403	0.458	0.431	1	0.431	0.0030
78	70.809	1069.4	OTHER C11	0.105	0.102	0.104	1	0.104	0.0007
79	70.967	1071.3	1,4-dimethyl-2-ethylbenzene	0.354	0.323	0.338	1	0.338	0.0023
80	71.108	1073.0	3-methyldecane	0.500	0.542	0.521	1	0.521	0.0036
81	71.398	1076.5	1,3-dimethyl-4-ethylbenzene	0.104	0.075	0.089	1	0.089	0.0006

Table A5. Sample #5 (One Step Oil Stain) (Continued).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Reponse Factor	Adjusted Area	Fraction
82	71.571	1078.6	ethyl propylcyclohexane	0.070	0.081	0.075	1	0.075	0.0005
83	71.874	1082.3	1-methylindane	0.230	0.228	0.229	1	0.229	0.0016
84	72.245	1086.8	ethyl propylcyclohexane	0.204	0.165	0.184	1	0.184	0.0013
85	72.552	1090.6	ethyl propylcyclohexane	0.109	0.066	0.087	1	0.087	0.0006
86	72.763	1093.2	cis-decalin	0.397	0.395	0.396	1	0.396	0.0027
87	73.326	1100.0	undecane	1.840	1.805	1.823	1	1.823	0.0126
88	73.805	1106.1	6-ethyl-2-methyloctane	0.120	0.063	0.091	1	0.091	0.0006
89	73.896	1107.3	2-methyldecalin	0.238	0.184	0.211	1	0.211	0.0015
90	74.071	1109.5	4,6-dimethyldecane	0.151	0.084	0.118	1	0.118	0.0008
91	74.322	1112.7	OTHER C12	0.090	0.073	0.081	1	0.081	0.0006
92	74.9	1120.1	2,6-dimethyldecane	0.349	0.333	0.341	1	0.341	0.0024
93	75.206	1124.0	2-methyldecalin	0.149	0.119	0.134	1	0.134	0.0009
94	75.709	1130.4	3,7-dimethyldecane	0.501	0.496	0.498	1	0.498	0.0034
95	76.066	1135.0	2,7-dimethyldecane	0.095	0.073	0.084	1	0.084	0.0006
96	76.559	1141.3	OTHER C12	0.128	0.106	0.117	1	0.117	0.0008
97	76.868	1145.2	pentylcyclohexane	0.277	0.227	0.252	1	0.252	0.0017
98	77.117	1148.4	1-butyl-3-methylbenzene	0.291	0.285	0.288	1	0.288	0.0020
99	77.69	1155.7	5-methylundecane	0.374	0.352	0.363	1	0.363	0.0025
100	78.101	1161.0	4-methylundecane	0.162	0.132	0.147	1	0.147	0.0010
101	78.447	1165.4	1,2,3,4-tetramethylbenzene	0.277	0.274	0.276	1	0.276	0.0019
102	79.008	1172.6	3-methylundecane	0.177	0.163	0.170	1	0.170	0.0012
103	80.629	1193.3	5,6-dimethylindane	0.140	0.107	0.124	1	0.124	0.0009
104	81.154	1200.0	dodecane	0.984	0.871	0.928	1	0.928	0.0064
105	81.978	1211.0	2,4-dimethylundecane	0.122	0.096	0.109	1	0.109	0.0008
106	82.416	1216.9	2,6-dimethylundecane	0.317	0.277	0.297	1	0.297	0.0020
107	82.96	1224.1	2-(2-ethylhexyl)ethanol	0.144	0.072	0.108	0.61	0.177	0.0012
				100.000	100.000	100.000		145.012	1.0000
						Fraction Identified =			0.9923

Table A6. Sample #6 (Top Coat).

Compound	da6a	da6b	average	fraction
methanol				0.0000
ethanol				0.0000
2-propanol				0.0000
2-butoxyethanol				0.0000
1-butoxy-2-propanol	5.53	5.74	5.63	0.6298
2-butoxy-1-propanol	0.19	0.20	0.20	0.0218
dipropylene glycol, monomethyl ether	2.60	2.55	2.57	0.2879
1,3-propanediol				0.0000
2-(2-butoxyethoxy)ethanol	0.57	0.52	0.54	0.0605
dipropylene glycol, monobutyl ether				0.0000
Unknown *				0.0000
dibutyl phthalate				0.0000
% glycerin (split injection at 140C)				0.0000
%Total VOC	8.89	9.00	8.94	1.0000
VOC from MSDS, g/L	86			
%glycerin** Non-split/programmed run				

* Approximately the same retention time as Texanol which is C-12 H-24 O-3

** Peak shapes are so bad that it is very difficult to get reproducible area counts.

Table A7. Sample #7 (Sanding Sealer).

compound	da7a	da7b	average	fraction
methanol	0.14	0.13	0.135	0.0147
ethanol				0.0000
2-propanol				0.0000
2-butoxyethanol				0.0000
1-butoxy-2-propanol	6.42	6.42	6.417863	0.6968
2-butoxy-1-propanol	0.22	0.22	0.21923	0.0238
dipropylene glycol, monomethyl ether	0.25	0.24	0.245565	0.0267
1,3-propanediol				0.0000
2-(2-butoxyethoxy)ethanol	0.12	0.11	0.113332	0.0123
dipropylene glycol, monobutyl ether	1.51	1.64	1.576369	0.1711
Unknown *				0.0000
dibutyl phthalate	0.45	0.56	0.50375	0.0547
% glycerin (split injection at 140C)				0.0000
%Total VOC	9.11	9.31	9.211108	1.0000
VOC from MSDS, g/L	91.00			
%glycerin** Non-split/programmed run				

* Approximately the same retention time as Texanol which is C-12 H-24 O-3

** Peak shapes are so bad that it is very difficult to get reproducible area counts.

Table A8. Sample #8 (One Step Stain).

Compound	da8a	da8b	average	fraction
methanol	0.05	0.03	0.04	0.0037
ethanol	0.03	0.03	0.03	0.0028
2-propanol				0.0000
2-butoxyethanol				0.0000
1-butoxy-2-propanol				0.0000
2-butoxy-1-propanol				0.0000
dipropylene glycol, monomethyl ether				0.0000
1,3-propanediol	0.72	0.86	0.79	0.0733
2-(2-butoxyethoxy)ethanol				0.0000
dipropylene glycol, monobutyl ether				0.0000
Unknown *				0.0000
dibutyl phthalate				0.0000
% glycerin (split injection at 140C)	9.92	9.99	9.95	0.9202
%Total VOC	10.72	10.91	10.82	1.0000
VOC from MSDS, g/L	0			
%glycerin** Non-split/programmed run	6.65	5.82		

* Approximately the same retention time as Texanol which is C-12 H-24 O-3

** Peak shapes are so bad that it is very difficult to get reproducible area counts.

Table A9. Sample #9 (Stain).

Compound	da9a	da9b	average	fraction
methanol	0.02	0.02	0.02	0.0020
ethanol				0.0000
2-propanol				0.0000
2-butoxyethanol	2.10	2.17	2.135	0.2106
1-butoxy-2-propanol				0.0000
2-butoxy-1-propanol				0.0000
dipropylene glycol, monomethyl ether				0.0000
1,3-propanediol				0.0000
2-(2-butoxyethoxy)ethanol				0.0000
dipropylene glycol, monobutyl ether				0.0000
Unknown *	0.40	0.43	0.417333	0.0412
dibutyl phthalate				0.0000
% glycerin (split injection at 140C)	7.42	7.71	7.563348	0.7462
%Total VOC	9.94	10.33	10.13568	1.0000
VOC from MSDS, g/L	30.00			
%glycerin** Non-split/programmed run	6.45	5.63		

* Approximately the same retention time as Texanol which is C-12 H-24 O-3
** Peak shapes are so bad that it is very difficult to get reproducible area counts.

Table A10. Sample #10 (Walnut Stain).

Compound	da10a	da10b	da10c	average	fraction
methanol	0.85	0.83		0.8400	0.0583
ethanol					0.0000
2-propanol	0.06	0.07		0.0650	0.0045
2-butoxyethanol	2.43	2.33		2.3838	0.1655
1-butoxy-2-propanol					0.0000
2-butoxy-1-propanol					0.0000
dipropylene glycol, monomethyl ether					0.0000
1,3-propanediol					0.0000
2-(2-butoxyethoxy)ethanol					0.0000
dipropylene glycol, monobutyl ether					0.0000
Unknown *					0.0000
dibutyl phthalate					0.0000
% glycerin (split injection at 140C)	10.85943	11.47	11.01	11.1129	0.7716
%Total VOC	14.20	14.70		14.4018	1.0000
VOC from MSDS, g/L	27				
%glycerin** Non-split/programmed run	11.58	11.42			

* Approximately the same retention time as Texanol which is C-12 H-24 O-3

** Peak shapes are so bad that it is very difficult to get reproducible area counts.

Table A11. Sample #11 (Cinnamon Stain).

Compound	da10a	da10b	da10c	average	fraction
methanol					0.0000
ethanol					0.0000
2-propanol					0.0000
2-butoxyethanol					0.0000
1-butoxy-2-propanol					0.0000
2-butoxy-1-propanol					0.0000
dipropylene glycol, monomethyl ether					0.0000
1,3-propanediol					0.0000
2-(2-butoxyethoxy)ethanol					0.0000
dipropylene glycol, monobutyl ether					0.0000
Unknown *					0.0000
dibutyl phthalate					0.0000
% glycerin (split injection at 140C)	6.26	5.81	6.01	6.0252	1.0000
%Total VOC	6.26	5.81	6.01	6.0252	1.0000
VOC from MSDS, g/L	0.00				
%glycerin** Non-split/programmed run	5.50	5.95			

* Approximately the same retention time as Texanol which is C-12 H-24 O-3
** Peak shapes are so bad that it is very difficult to get reproducible area counts.

Table A12. Sample #12 (Light Spray Stain).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Response Factor	Adjusted Area	Fraction
1	17.887	474.0	isopropyl alcohol	4.665	4.418	4.541	0.54	8.410	0.0668
2	23.39	568.1	methyl ethyl ketone	6.756	6.560	6.658	0.63	10.568	0.0840
3	29.945	644.9	butanol	3.026	3.058	3.042	0.7	4.346	0.0345
4	31.321	658.7	cyclohexane	0.585	0.584	0.585	1	0.585	0.0046
5	31.965	665.2	2-methylhexane	1.572	1.565	1.568	1	1.568	0.0125
6	32.237	667.9	2,3-dimethylpentane	0.674	0.668	0.671	1	0.671	0.0053
7	32.659	672.2	1,1-dimethylcyclopentane	0.242	0.239	0.240	1	0.240	0.0019
8	32.895	674.5	3-methylhexane	2.19	2.177	2.184	1	2.184	0.0173
9	33.733	683.0	trans-1,3-dimethylcyclopentane	0.689	0.695	0.692	1	0.692	0.0055
10	34.029	685.9	cis-1,3-dimethylcyclopentane	0.88	0.881	0.881	1	0.881	0.0070
11	34.32	688.9	cis-1,3-dimethylcyclopentane	1.296	1.292	1.294	1	1.294	0.0103
12	35.429	700.0	heptane	5.559	5.575	5.567	1	5.567	0.0442
13	37.801	722.1	1,2-dimethylcyclopentane	0.279	0.280	0.279	1	0.279	0.0022
14	37.949	723.5	methylcyclohexane	5.822	5.879	5.851	1	5.851	0.0465
15	38.179	725.6	1,1,3-trimethylcyclopentane	0.393	0.383	0.388	1	0.388	0.0031
16	38.927	732.6	2,5-dimethylhexane	0.282	0.282	0.282	1	0.282	0.0022
17	39.109	734.3	2,4-dimethylhexane	1.075	1.102	1.088	1	1.088	0.0086
18	39.99	742.5	1,2,4-trimethylcyclopentane	0.51	0.521	0.515	1	0.515	0.0041
19	40.775	749.8	1,2,3-trimethylcyclopentane	0.478	0.486	0.482	1	0.482	0.0038
20	41.046	752.3	2,3,4-trimethylpentane	0.08	0.081	0.080	1	0.080	0.0006
21	41.583	757.3	toluene	33.272	33.497	33.385	1	33.385	0.2653
22	42.075	761.9	2,3-dimethylhexane	0.106	0.098	0.102	1	0.102	0.0008
23	42.271	763.8	3-ethyl-2-methylpentane	0.047	0.043	0.045	1	0.045	0.0004
24	42.596	766.8	2-methylheptane	0.512	0.476	0.494	1	0.494	0.0039
25	42.776	768.5	4-methylheptane	0.104	0.115	0.110	1	0.110	0.0009

Table A12. Sample #12 (Light Spray Stain) (Continued).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Response Factor	Adjusted Area	Fraction
26	43.109	771.6	3,4-dimethylhexane	0.033	0.026	0.030	1	0.030	0.0002
27	43.428	774.5	3-methylheptane	0.147	0.154	0.150	1	0.150	0.0012
28	43.584	776.0	3-ethylhexane	0.037	0.037	0.037	1	0.037	0.0003
29	44.044	780.3	cis-1,3-dimethylcyclohexane	0.099	0.090	0.094	1	0.094	0.0008
30	44.227	782.0	trans-1,4-dimethylcyclohexane	0.039	0.029	0.034	1	0.034	0.0003
31	44.926	788.5	1,1-dimethylcyclohexane	0.012	0.014	0.013	1	0.013	0.0001
32	45.067	789.8	cis-1-ethyl-3-methylcyclopentane	0.016	0.007	0.012	1	0.012	0.0001
33	45.448	793.4	cis-1-ethyl-2-methylcyclopentane	0.015	0.014	0.015	1	0.015	0.0001
34	45.688	795.6	butyl acetate	21.664	21.617	21.641	0.61	35.477	0.2819
35	46.161	800.0	octane	0.022	0.021	0.022	1	0.022	0.0002
36	51.489	853.7	ethylbenzene	0.401	0.414	0.408	1	0.408	0.0032
37	52.312	862.0	m-xylene	0.98	1.006	0.993	1	0.993	0.0079
38	52.42	863.1	p-xylene	0.378	0.408	0.393	1	0.393	0.0031
39	54.635	885.5	o-xylene	0.214	0.227	0.221	1	0.221	0.0018
40	54.919	888.3	2-butoxyethanol	3.081	3.205	3.143	0.58	5.419	0.0431
41	56.076	900.0	nonane	0.111	0.091	0.101	1	0.101	0.0008
42	58.458	926.6	1-butoxy-2-propanol	1.051	1.099	1.075	0.58	1.853	0.0147
43	64.094	989.5	1,2,4-trimethylbenzene	0.095	0.113	0.104	1	0.104	0.0008
44	65.039	1000.0	decane	0.157	0.190	0.174	1	0.174	0.0014
45	73.259	1100.0	undecane	0.134	0.145	0.139	1	0.139	0.0011
46	81.074	1200.0	dodecane	0.07	0.061	0.065	1	0.065	0.0005
				99.85	99.925	99.888		125.860	1.0000
						Fraction Identified =			1.0000

Table A13. Sample #13 (Lacquer Sanding Sealer).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Reponse Factor	Adjusted Area	Fraction
1	17.43	461.5	acetone	3.041	3.11	3.076	0.525	5.858	0.0450
2	17.856	472.2	isopropyl alcohol	9.789	9.746	9.768	0.54	18.088	0.1390
3	23.358	567.2	methyl ethyl ketone	10.598	10.608	10.603	0.63	16.830	0.1293
4	26.599	611.1	isobutyl alcohol	0.578	0.571	0.574	0.68	0.845	0.0065
5	29.915	644.6	butyl alcohol	1.844	1.811	1.828	0.7	2.611	0.0201
6	35.394	700.0	heptane	0.090	0.088	0.089	1	0.089	0.0007
7	37.654	721.0	methyl isobutyl ketone	9.425	9.373	9.399	0.75	12.532	0.0963
8	37.918	723.5	methylcyclohexane	0.182	0.182	0.182	1	0.182	0.0014
9	39.143	734.9	2,4-dimethylhexane	0.014	0.028	0.021	1	0.021	0.0002
10	39.94	742.3	1,2,4-trimethylcyclopentane	0.023	0.03	0.026	1	0.026	0.0002
11	40.744	749.8	1,2,3-trimethylcyclopentane	0.027	0.006	0.017	1	0.017	0.0001
12	41.551	757.3	toluene	19.298	19.198	19.248	1	19.248	0.1479
13	42.044	761.9	2,3-dimethylhexane	0.023	0.022	0.022	1	0.022	0.0002
14	42.569	766.8	2-methylheptane	0.252	0.248	0.250	1	0.250	0.0019
15	42.743	768.4	4-methylheptane	0.069	0.065	0.067	1	0.067	0.0005
16	43.043	771.2	3,4-dimethylhexane	0.017	0.018	0.018	1	0.018	0.0001
17	43.403	774.6	3-methylheptane	0.186	0.176	0.181	1	0.181	0.0014
18	43.547	775.9	3-ethylhexane	0.043	0.034	0.038	1	0.038	0.0003
19	43.988	780.0	cis-1,3-dimethylcyclohexane	1.155	1.155	1.155	1	1.155	0.0089
20	44.195	782.0	trans-1,4-dimethylcyclohexane	0.383	0.387	0.385	1	0.385	0.0030
21	44.892	788.5	1,1-dimethylcyclohexane	0.007	0.007	0.007	1	0.007	0.0001
22	45.04	789.8	cis-1-ethyl-3-methylcyclopentane	0.062	0.065	0.063	1	0.063	0.0005
23	45.278	792.1	trans-1-ethyl-3-methylcyclopentane	0.050	0.055	0.053	1	0.053	0.0004
24	45.414	793.3	cis-1-ethyl-2-methylcyclopentane	0.115	0.114	0.114	1	0.114	0.0009
25	45.65	795.5	butyl acetate	10.148	10.076	10.112	0.61	16.577	0.1274

Table A13. Sample #13 (Lacquer Sanding Sealer) (Continued).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Reponse Factor	Adjusted Area	Fraction
26	46.131	800.0	octane	1.907	1.893	1.900	1	1.900	0.0146
27	46.567	804.4	cis-1,4-dimethylcyclohexane	0.069	0.067	0.068	1	0.068	0.0005
28	46.841	807.2	trans-1,3-dimethylcyclohexane	0.631	0.628	0.629	1	0.629	0.0048
29	47.53	814.2	1-ethyl-1-methylcyclopentane	0.067	0.06	0.064	1	0.064	0.0005
30	47.989	818.8	2,2-dimethylheptane	0.034	0.026	0.030	1	0.030	0.0002
31	48.252	821.5	2,2,5-trimethylhexane	0.072	0.051	0.061	1	0.061	0.0005
32	48.64	825.4	2,4-dimethylheptane	0.161	0.161	0.161	1	0.161	0.0012
33	49.266	831.7	cis-1,2-dimethylcyclohexane	0.989	1.026	1.007	1	1.007	0.0077
34	49.528	834.4	propylcyclopentane	0.112	0.137	0.124	1	0.124	0.0010
35	49.671	835.8	cis, cis-1,3,5-trimethylcyclohexane	0.294	0.323	0.308	1	0.308	0.0024
36	49.784	837.0	ethylcyclohexane	0.985	1.035	1.010	1	1.010	0.0078
37	49.964	838.8	2,5-dimethylheptane	0.242	0.323	0.283	1	0.283	0.0022
38	50.336	842.6	1,1,3-trimethylcyclohexane	1.016	1.036	1.026	1	1.026	0.0079
39	50.615	845.4	1,1,4-trimethylcyclohexane	0.138	0.153	0.145	1	0.145	0.0011
40	50.743	846.7	OTHER C9	0.057	0.058	0.058	1	0.058	0.0004
41	50.891	848.2	OTHER C9	0.095	0.101	0.098	1	0.098	0.0008
42	51.466	854.0	ethylbenzene	2.795	2.776	2.785	1	2.785	0.0214
43	51.857	858.0	trans, trans-1,2,4-trimethylcyclohexane	0.767	0.762	0.764	1	0.764	0.0059
44	52.067	860.1	2,3-dimethylheptane	0.436	0.479	0.457	1	0.457	0.0035
45	52.3	862.5	m-xylene	6.789	6.683	6.736	1	6.736	0.0518
46	52.403	863.5	p-xylene	2.413	2.413	2.413	1	2.413	0.0185
47	52.773	867.3	4-methyloctane	0.967	0.966	0.967	1	0.967	0.0074
48	53.069	870.3	2-methyloctane	0.444	0.446	0.445	1	0.445	0.0034
49	53.471	874.3	3-methyloctane	0.848	0.845	0.847	1	0.847	0.0065
50	53.761	877.3	1,2,3-trimethylcyclohexane	0.020	0.029	0.025	1	0.025	0.0002

Table A13. Sample #13 (Lacquer Sanding Sealer) (Continued).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Reponse Factor	Adjusted Area	Fraction
51	54.221	881.9	trans, cis-1,2,4-trimethylcyclohexane	0.487	0.468	0.478	1	0.478	0.0037
52	54.612	885.9	o-xylene	1.629	1.629	1.629	1	1.629	0.0125
53	54.905	888.8	1,2,3-trimethylcyclohexane	0.408	0.415	0.412	1	0.412	0.0032
54	55.125	891.1	1,1,2-trimethylcyclohexane	0.054	0.054	0.054	1	0.054	0.0004
55	55.277	892.6	cis-1-ethyl-3-methylcyclohexane	0.417	0.422	0.420	1	0.420	0.0032
56	55.533	895.2	trans-1-ethyl-3-methylcyclohexane	0.191	0.196	0.193	1	0.193	0.0015
57	56.007	900.0	isobutyl isobutyrate	5.235	5.212	5.224	0.67	7.796	0.0599
58	56.007	900.0	nonane	0.946	0.946	0.946	1	0.946	0.0073
59	56.648	918.9	isopropylbenzene	0.039	0.037	0.038	1	0.038	0.0003
60	56.958	928.0	2,5-dimethyloctane	0.093	0.088	0.091	1	0.091	0.0007
61	57.18	934.6	propylcyclohexane	0.254	0.253	0.253	1	0.253	0.0019
62	57.439	942.2	3,6-dimethyloctane	0.042	0.044	0.043	1	0.043	0.0003
63	57.585	946.5	3-ethyl-2-methylheptane	0.014	0.021	0.018	1	0.018	0.0001
64	57.905	956.0	1-ethyl-3-methylbenzene	0.027	0.134	0.081	1	0.081	0.0006
65	58.411	970.9	3-methylnonane	0.010	0.009	0.010	1	0.010	0.0001
									0.0000
				99.613	99.578	99.596		130.150	1.0000
						Fraction Identified =			0.9988

Table A14. Sample #14 (Lacquer Thinner).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Reponse Factor	Adjusted Area	Fraction
1	18.698	468.4	isopropyl alcohol	4.843	4.862	4.852	0.54	8.985	0.0731
2	24.342	566.8	methyl ethyl ketone	7.567	7.708	7.637	0.63	12.123	0.0986
3	29.23	627.3	methylcyclopentane	0.046	0.048	0.047	1	0.047	0.0004
4	30.961	644.7	butyl alcohol	4.523	4.520	4.522	0.7	6.460	0.0525
5	31.845	653.6	3-methylhexane	0.062	0.068	0.065	1	0.065	0.0005
6	32.356	658.8	cyclohexane	0.642	0.681	0.661	1	0.661	0.0054
7	32.988	665.1	2-methylhexane	1.748	1.791	1.769	1	1.769	0.0144
8	33.264	667.9	2,3-dimethylpentane	0.746	0.766	0.756	1	0.756	0.0061
9	33.695	672.2	1,1-dimethylcyclopentane	0.271	0.277	0.274	1	0.274	0.0022
10	33.921	674.5	3-methylhexane	2.415	2.469	2.442	1	2.442	0.0199
11	34.77	683.1	trans-1,3-dimethylcyclopentane	0.762	0.784	0.773	1	0.773	0.0063
12	35.065	686.0	cis-1,3-dimethylcyclopentane	0.964	0.989	0.976	1	0.976	0.0079
13	35.357	689.0	1,2-dimethylcyclopentane	1.414	1.450	1.432	1	1.432	0.0116
14	36.454	700.0	heptane	6.031	6.126	6.079	1	6.079	0.0494
15	38.842	722.2	methyl isobutyl ketone	0.325	0.310	0.317	0.75	0.423	0.0034
16	38.991	723.6	methylcyclohexane	6.301	6.414	6.357	1	6.357	0.0517
17	39.213	725.7	1,1,3-trimethylcyclopentane	0.425	0.425	0.425	1	0.425	0.0035
18	39.947	732.5	ethylcyclopentane	0.312	0.314	0.313	1	0.313	0.0025
19	40.15	734.4	2,4-dimethylhexane	1.179	1.211	1.195	1	1.195	0.0097
20	41.021	742.5	1,2,4-trimethylcyclopentane	0.581	0.588	0.584	1	0.584	0.0048
21	41.804	749.8	1,2,3-trimethylcyclopentane	0.542	0.548	0.545	1	0.545	0.0044
22	42.063	752.2	2,3,4-trimethylpentane	0.084	0.088	0.086	1	0.086	0.0007

Table A14. Sample #14 (Lacquer Thinner) (Continued).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Reponse Factor	Adjusted Area	Fraction
23	42.612	757.4	toluene	24.539	24.476	24.507	1	24.507	0.1992
24	43.091	761.8	2,3-dimethylhexane	0.108	0.109	0.108	1	0.108	0.0009
25	43.3	763.8	3-ethyl-2-methylpentane	0.046	0.051	0.049	1	0.049	0.0004
26	43.606	766.6	2-methylheptane	0.618	0.555	0.586	1	0.586	0.0048
27	43.781	768.3	4-methylheptane	0.131	0.137	0.134	1	0.134	0.0011
28	44.115	771.4	3,4-dimethylhexane	0.029	0.028	0.029	1	0.029	0.0002
29	44.435	774.3	3-methylheptane	0.168	0.165	0.167	1	0.167	0.0014
30	44.6	775.9	3-ethylhexane	0.045	0.040	0.043	1	0.043	0.0003
31	45.371	783.1	trans-1,4-dimethylcyclohexane	0.109	0.108	0.108	1	0.108	0.0009
32	46.682	795.3	butyl acetate	19.475	19.123	19.299	0.61	31.638	0.2572
33	52.495	853.5	ethylbenzene	2.630	2.586	2.608	1	2.608	0.0212
34	53.323	861.9	m-xylene	6.531	6.423	6.477	1	6.477	0.0527
35	53.424	862.9	p-xylene	2.404	2.394	2.399	1	2.399	0.0195
36	55.637	885.2	o-xylene	1.389	1.368	1.378	1	1.378	0.0112
									0.0000
				100.000	100.000	100.000		123.001	1.0000
							Fraction Identified =		1.0000

Table A15. Sample #15 (One Step Oil Stain).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Reponse Factor	Adjusted Area	Fraction
1	46.473	800.0	octane	0.066	0.063	0.065	1	0.065	0.0005
2	46.913	804.3	cis-1,4-dimethylcyclohexane	0.010	0.022	0.016	1	0.016	0.0001
3	47.158	807.0	trans-1,3-dimethylcyclohexane	0.015	0.021	0.018	1	0.018	0.0002
4	49.603	831.6	cis-1,2-dimethylcyclohexane	0.052	0.054	0.053	1	0.053	0.0004
5	49.695	832.6	2,6-dimethylheptane	0.013	0.015	0.014	1	0.014	0.0001
6	50.013	835.7	cis, cis-1,3,5-trimethylcyclohexane	0.099	0.108	0.104	1	0.104	0.0009
7	50.129	837.0	ethylcyclohexane	0.053	0.044	0.049	1	0.049	0.0004
8	50.304	838.7	2,5-dimethylheptane	0.037	0.027	0.032	1	0.032	0.0003
9	50.681	842.5	1,1,3-trimethylcyclohexane	0.265	0.263	0.264	1	0.264	0.0022
10	50.909	844.9	2-acetoxy-1-methoxypropane	11.423	11.345	11.384	0.45	25.298	0.2112
11	51.238	848.1	OTHER C9	0.023	0.024	0.024	1	0.024	0.0002
12	51.803	853.8	ethylbenzene	0.185	0.175	0.180	1	0.180	0.0015
13	52.04	856.2	trans, trans-1,3,5-trimethylcyclohexane	0.100	0.095	0.098	1	0.098	0.0008
14	52.2	857.8	trans, trans-1,2,4-trimethylcyclohexane	0.452	0.455	0.454	1	0.454	0.0038
15	52.402	859.9	2,3-dimethylheptane	0.202	0.197	0.199	1	0.199	0.0017
16	52.651	862.3	m-xylene	0.426	0.422	0.424	1	0.424	0.0035
17	53.106	866.9	4-methyloctane	0.367	0.371	0.369	1	0.369	0.0031
18	53.356	869.5	2-methyloctane	0.040	0.042	0.041	1	0.041	0.0003
19	53.507	870.8	OTHER C9	0.032	0.034	0.033	1	0.033	0.0003
20	53.801	873.9	3-methyloctane	0.412	0.416	0.414	1	0.414	0.0035
21	54.097	876.9	1,2,3-trimethylcyclohexane	0.149	0.144	0.146	1	0.146	0.0012
22	54.548	881.4	trans, cis-1,2,4-trimethylcyclohexane	0.618	0.615	0.616	1	0.616	0.0051
23	54.945	885.4	o-xylene	0.506	0.504	0.505	1	0.505	0.0042
24	55.315	889.1	1,2,3-trimethylcyclohexane	0.663	0.661	0.662	1	0.662	0.0055
25	55.479	890.8	1,1,2-trimethylcyclohexane	0.247	0.252	0.250	1	0.250	0.0021

Table A15. Sample #15 (One Step Oil Stain) (Continued).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Reponse Factor	Adjusted Area	Fraction
26	55.617	892.1	cis-1-ethyl-3-methylcyclohexane	0.756	0.748	0.752	1	0.752	0.0063
27	55.871	894.7	trans-1-ethyl-3-methylcyclohexane	0.507	0.504	0.506	1	0.506	0.0042
28	56.15	897.6	cis, cis-1,2,4-trimethylcyclohexane	0.329	0.339	0.334	1	0.334	0.0028
29	56.389	900.0	nonane	3.100	3.068	3.084	1	3.084	0.0257
30	56.972	906.5	trans-1-ethyl-2-methylcyclohexane	0.480	0.481	0.481	1	0.481	0.0040
31	57.299	910.1	cis, trans-1,2,3-trimethylcyclohexane	0.387	0.381	0.384	1	0.384	0.0032
32	57.536	912.7	trans-1-ethyl-4-methylcyclohexane	1.161	1.155	1.158	1	1.158	0.0097
33	57.784	915.5	cis-1-ethyl-4-methylcyclohexane	0.252	0.244	0.248	1	0.248	0.0021
34	58.026	918.2	isopropylbenzene	0.333	0.318	0.326	1	0.326	0.0027
35	58.232	920.6	3,4-dimethyloctane	0.372	0.360	0.366	1	0.366	0.0031
36	58.589	924.5	2,4-dimethyloctane	0.221	0.219	0.220	1	0.220	0.0018
37	58.792	926.9	1-butoxy-2-propanol	7.233	7.215	7.224	0.58	12.455	0.1040
38	59.251	932.0	cis-1-ethyl-2-methylcyclohexane	0.365	0.355	0.360	1	0.360	0.0030
39	59.617	936.0	propylcyclohexane	1.680	1.699	1.690	1	1.690	0.0141
40	59.726	937.3	2,6-dimethyloctane	1.903	1.875	1.889	1	1.889	0.0158
41	60.065	941.0	2-butoxy-1-propanol	0.918	0.919	0.918	0.58	1.583	0.0132
42	60.241	943.0	3,6-dimethyloctane	0.458	0.449	0.454	1	0.454	0.0038
43	60.539	946.3	3-ethyl-2-methylheptane	1.143	1.136	1.140	1	1.140	0.0095
44	60.768	948.8	propylbenzene	1.177	1.169	1.173	1	1.173	0.0098
45	61.106	952.6	4-ethyloctane	0.425	0.427	0.426	1	0.426	0.0036
46	61.387	955.7	1-ethyl-3-methylbenzene	2.089	2.091	2.090	1	2.090	0.0174
47	61.61	958.3	1-ethyl-4-methylbenzene	1.739	1.729	1.734	1	1.734	0.0145
48	62.101	963.8	4-methylnonane	3.005	2.988	2.997	1	2.997	0.0250
49	62.337	966.4	2-methylnonane	1.045	1.047	1.046	1	1.046	0.0087
50	62.485	967.9	1-ethyl-1,3-dimethylcyclohexane	1.557	1.545	1.551	1	1.551	0.0129

Table A15. Sample #15 (One Step Oil Stain) (Continued).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Reponse Factor	Adjusted Area	Fraction
51	62.685	970.2	3-methylnonane	0.591	0.586	0.588	1	0.588	0.0049
52	62.958	973.3	1-ethyl-2-methylbenzene	1.024	1.031	1.027	1	1.027	0.0086
53	63.087	974.7	OTHER C10	0.894	0.869	0.882	1	0.882	0.0074
54	63.327	977.3	1-methyl-4-isopropylcyclohexane	0.389	0.397	0.393	1	0.393	0.0033
55	63.641	980.9	1-methyl-3-isopropylcyclohexane	0.909	0.908	0.909	1	0.909	0.0076
56	63.892	983.7	2-ethyl-1,3-dimethylcyclohexane	0.854	0.843	0.848	1	0.848	0.0071
57	64.012	985.0	2-ethyl-1,3-dimethylcyclohexane	0.476	0.483	0.480	1	0.480	0.0040
58	64.198	987.1	diethylcyclohexane	0.341	0.341	0.341	1	0.341	0.0028
59	64.414	989.5	1,2,4-trimethylbenzene	4.948	4.926	4.937	1	4.937	0.0412
60	64.802	993.8	1-methyl-2-isopropylcyclohexane	1.038	1.038	1.038	1	1.038	0.0087
61	65.024	996.3	1,2-dimethyl-3-ethylcyclohexane	0.542	0.514	0.528	1	0.528	0.0044
62	65.129	997.4	diethylcyclohexane	0.367	0.395	0.381	1	0.381	0.0032
63	65.344	1000.0	decane	5.497	5.474	5.485	1	5.485	0.0458
64	65.572	1002.7	methyl propylcyclohexane	0.351	0.355	0.353	1	0.353	0.0029
65	65.777	1005.2	diethylcyclohexane	0.657	0.639	0.648	1	0.648	0.0054
66	65.995	1007.8	methyl propylcyclohexane	0.733	0.713	0.723	1	0.723	0.0060
67	66.413	1012.9	2,4-dimethylnonane	0.108	0.117	0.113	1	0.113	0.0009
68	66.55	1014.5	1-methyl-3-isopropylbenzene	0.235	0.226	0.231	1	0.231	0.0019
69	66.709	1016.5	2,5-dimethylnonane	0.648	0.648	0.648	1	0.648	0.0054
70	66.946	1019.4	1,2,3-trimethylbenzene	1.912	1.905	1.908	1	1.908	0.0159
71	67.114	1021.4	3,5-dimethylnonane	0.705	0.709	0.707	1	0.707	0.0059
72	67.449	1025.6	2,6-dimethylnonane	1.831	1.817	1.824	1	1.824	0.0152
73	67.869	1030.6	5-ethyl-3-methyloctane	0.875	0.771	0.823	1	0.823	0.0069
74	68.129	1033.7	indane	0.372	0.380	0.376	1	0.376	0.0031
75	68.275	1035.6	2,7-dimethylnonane	0.583	0.585	0.584	1	0.584	0.0049

Table A15. Sample #15 (One Step Oil Stain) (Continued).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Reponse Factor	Adjusted Area	Fraction
76	68.467	1038.0	butylcyclohexane	0.536	0.530	0.533	1	0.533	0.0045
77	68.659	1040.3	pentylcyclopentane	0.955	0.955	0.955	1	0.955	0.0080
78	68.852	1042.7	3,7-dimethylnonane	0.774	0.764	0.769	1	0.769	0.0064
79	69.045	1044.9	1-methyl-3-propylbenzene	0.370	0.357	0.364	1	0.364	0.0030
80	69.262	1047.6	4-ethylnonane	0.797	0.802	0.799	1	0.799	0.0067
81	69.713	1053.1	3-ethylnonane	1.312	1.336	1.324	1	1.324	0.0111
82	70.048	1054.7	5-ethyl-2-methyloctane	0.100	0.100	0.100	1	0.100	0.0008
83	70.219	1059.3	5-methyldecane	0.656	0.668	0.662	1	0.662	0.0055
84	70.468	1062.4	4-methyldecane	0.869	0.892	0.881	1	0.881	0.0073
85	70.751	1065.8	trans-decalin	0.775	0.771	0.773	1	0.773	0.0065
86	71.033	1069.2	5-isopropylnonane	0.245	0.246	0.246	1	0.246	0.0020
87	71.214	1071.2	1,4-dimethyl-2-ethylbenzene	0.724	0.727	0.725	1	0.725	0.0061
88	71.328	1072.8	3-methyldecane	1.055	1.038	1.046	1	1.046	0.0087
89	71.629	1076.4	1,3-dimethyl-4-ethylbenzene	0.206	0.284	0.245	1	0.245	0.0020
90	71.842	1078.6	ethyl propylcyclohexane	0.176	0.177	0.176	1	0.176	0.0015
91	72.108	1082.2	1-methylindane	0.673	0.686	0.679	1	0.679	0.0057
92	72.487	1086.8	ethyl propylcyclohexane	0.495	0.477	0.486	1	0.486	0.0041
93	72.787	1090.4	ethyl propylcyclohexane	0.257	0.264	0.261	1	0.261	0.0022
94	73.001	1093.1	cis-decalin	0.938	0.924	0.931	1	0.931	0.0078
95	73.564	1100.0	undecane	3.320	3.336	3.328	1	3.328	0.0278
96	74.039	1106.1	6-ethyl-2-methyloctane	0.176	0.177	0.176	1	0.176	0.0015
97	74.137	1107.1	2-methyldecalin	0.324	0.577	0.451	1	0.451	0.0038
98	74.309	1109.5	4,6-dimethyldecane	0.236	0.395	0.315	1	0.315	0.0026
99	74.582	1112.7	2,4-dimethyldecane	0.129	0.151	0.140	1	0.140	0.0012
100	74.908	1116.9	1,2,4,5-tetramethylbenzene	0.320	0.305	0.313	1	0.313	0.0026

Table A15. Sample #15 (One Step Oil Stain) (Continued).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Reponse Factor	Adjusted Area	Fraction
101	75.152	1120.2	2,6-dimethyldecane	0.679	0.673	0.676	1	0.676	0.0056
102	75.521	1124.7	2-methyldecalin	0.235	0.231	0.233	1	0.233	0.0019
103	75.961	1130.5	3,7-dimethyldecane	0.792	0.786	0.789	1	0.789	0.0066
104	76.278	1134.6	2,7-dimethyldecane	0.073	0.069	0.071	1	0.071	0.0006
105	76.479	1137.2	(2-methylbutyl)cyclohexane	0.049	0.058	0.054	1	0.054	0.0004
106	76.79	1141.1	5-methylindane	0.186	0.187	0.186	1	0.186	0.0016
107	77.123	1145.3	pentylcyclohexane	0.411	0.407	0.409	1	0.409	0.0034
108	77.381	1148.5	1-butyl-3-methylbenzene	0.536	0.538	0.537	1	0.537	0.0045
109	77.732	1152.8	4-ethyldecane	0.085	0.126	0.106	1	0.106	0.0009
110	77.926	1155.6	5-methylundecane	0.621	0.590	0.605	1	0.605	0.0051
111	78.354	1161.2	4-methylundecane	0.280	0.266	0.273	1	0.273	0.0023
112	78.694	1165.5	1,2,3,4-tetramethylbenzene	0.585	0.517	0.551	1	0.551	0.0046
113	79.246	1172.6	3-methylundecane	0.336	0.328	0.332	1	0.332	0.0028
114	79.813	1179.5	3,8-dimethyldecane	0.038	0.065	0.052	1	0.052	0.0004
115	80.06	1182.9	methyl pentylcyclohexane	0.057	0.073	0.065	1	0.065	0.0005
116	80.425	1187.5	OTHER C12	0.041	0.053	0.047	1	0.047	0.0004
117	80.531	1188.8	naphthalene	0.122	0.130	0.126	1	0.126	0.0011
118	80.88	1193.1	5,6-dimethylindane	0.104	0.127	0.116	1	0.116	0.0010
119	81.069	1195.4	dimethylindane	0.116	0.122	0.119	1	0.119	0.0010
120	81.403	1200.0	dodecane	1.359	1.324	1.342	1	1.342	0.0112
121	81.879	1205.8	OTHER C13	0.049	0.045	0.047	1	0.047	0.0004
122	82.233	1210.6	2,4-dimethylundecane	0.110	0.101	0.106	1	0.106	0.0009
123	82.669	1216.1	2,6-dimethylundecane	0.417	0.412	0.414	1	0.414	0.0035
124	83.304	1224.4	2,7-dimethylundecane	0.160	0.170	0.165	1	0.165	0.0014
125	84.99	1245.3	6-methyldodecane	0.068	0.063	0.066	1	0.066	0.0005
126	85.343	1249.9	hexylcyclohexane	0.097	0.096	0.097	1	0.097	0.0008
				0.000	0.000	0.000			
				100.000	100.000	100.000		119.810	1.0000
					Fraction identified =				0.9914

Table A16. Sample #16 (Semi gloss lacquer top coat).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Reponse Factor	Adjusted Area	Fraction
1	17.374	463.2	acetone	3.779	3.610	3.694	0.525	7.037	0.0528
2	17.804	473.9	isopropyl alcohol	10.406	9.959	10.183	0.54	18.857	0.1415
3	23.286	567.8	methyl ethyl ketone	9.986	9.804	9.895	0.63	15.706	0.1179
4	26.525	611.4	isobutyl alcohol	0.359	0.359	0.359	0.68	0.528	0.0040
5	27.879	625.1	methylcyclopentane	0.05	0.049	0.050	1	0.050	0.0004
6	28.106	627.4	OTHER C7	0.017	0.015	0.016	1	0.016	0.0001
7	29.831	644.8	butyl alcohol	2.614	2.651	2.632	0.7	3.761	0.0282
8	31.197	658.6	cyclohexane	0.202	0.201	0.201	1	0.201	0.0015
9	31.843	665.1	2-methylhexane	0.188	0.191	0.189	1	0.189	0.0014
10	32.112	667.8	2,3-dimethylpentane	0.11	0.112	0.111	1	0.111	0.0008
11	32.533	672.1	1,1-dimethylcyclopentane	0.085	0.086	0.085	1	0.085	0.0006
12	32.771	674.5	3-methylhexane	0.295	0.297	0.296	1	0.296	0.0022
13	33.605	682.9	trans-1,3-dimethylcyclopentane	0.313	0.312	0.312	1	0.312	0.0023
14	33.903	685.9	cis-1,3-dimethylcyclopentane	0.354	0.352	0.353	1	0.353	0.0026
15	34.192	688.8	1,2-dimethylcyclopentane	0.543	0.551	0.547	1	0.547	0.0041
16	35.297	700.0	heptane	0.646	0.647	0.647	1	0.647	0.0049
17	37.556	721.1	1,2-dimethylcyclopentane	0.067	0.081	0.074	1	0.074	0.0006
18	37.664	722.1	methyl isobutyl ketone	0.131	0.131	0.131	0.75	0.175	0.0013
19	37.811	723.5	methylcyclohexane	1.019	1.030	1.024	1	1.024	0.0077
20	38.044	725.6	1,1,3-trimethylcyclopentane	0.185	0.180	0.183	1	0.183	0.0014
21	38.791	732.6	2,4-dimethylhexane	0.041	0.036	0.039	1	0.039	0.0003
22	38.97	734.3	2,5-dimethylhexane	0.226	0.229	0.227	1	0.227	0.0017
23	39.849	742.5	1,2,4-trimethylcyclopentane	0.27	0.273	0.272	1	0.272	0.0020
24	40.635	749.8	1,2,3-trimethylcyclopentane	0.39	0.393	0.392	1	0.392	0.0029
25	40.917	752.4	2,3,4-trimethylpentane	0.025	0.019	0.022	1	0.022	0.0002

Table A16. Sample #16 (Semi gloss lacquer top coat) (Continued).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Reponse Factor	Adjusted Area	Fraction
26	41.445	757.4	toluene	20.445	20.586	20.516	1	20.516	0.1540
27	41.938	762.0	2,3-dimethylhexane	0.04	0.036	0.038	1	0.038	0.0003
28	42.146	763.9	3-ethyl-2-methylpentane	0.021	0.016	0.019	1	0.019	0.0001
29	42.332	765.7	1,1,2-trimethylcyclopentane	0.028	0.031	0.030	1	0.030	0.0002
30	42.455	766.8	2-methylheptane	0.28	0.284	0.282	1	0.282	0.0021
31	42.636	768.5	4-methylheptane	0.062	0.068	0.065	1	0.065	0.0005
32	42.947	771.4	3,4-dimethylhexane	0.018	0.020	0.019	1	0.019	0.0001
33	43.281	774.5	3-methylheptane	0.151	0.155	0.153	1	0.153	0.0011
34	43.441	776.0	3-ethylhexane	0.036	0.040	0.038	1	0.038	0.0003
35	43.87	780.0	cis-1,3-dimethylcyclohexane	0.701	0.722	0.711	1	0.711	0.0053
36	44.076	781.9	trans-1,4-dimethylcyclohexane	0.236	0.239	0.237	1	0.237	0.0018
37	45.546	795.7	butyl acetate	12.393	12.438	12.415	0.61	20.353	0.1528
38	46.012	800.0	octane	1.12	1.127	1.124	1	1.124	0.0084
39	46.718	807.2	trans-1,3-dimethylcyclohexane	0.347	0.351	0.349	1	0.349	0.0026
40	49.137	831.7	cis-1,2-dimethylcyclohexane	0.48	0.513	0.497	1	0.497	0.0037
41	49.538	835.7	cis, cis-1,3,5-trimethylcyclohexane	0.145	0.163	0.154	1	0.154	0.0012
42	49.651	836.9	ethylcyclohexane	0.492	0.526	0.509	1	0.509	0.0038
43	49.834	838.7	2,5-dimethylheptane	0.131	0.180	0.156	1	0.156	0.0012
44	50.201	842.4	1,1,3-trimethylcyclohexane	0.49	0.510	0.500	1	0.500	0.0038
45	51.332	853.9	ethylbenzene	2.763	2.811	2.787	1	2.787	0.0209
46	51.72	857.8	trans, trans-1,2,4-trimethylcyclohexane	0.392	0.399	0.396	1	0.396	0.0030
47	51.933	860.0	2,3-dimethylheptane	0.227	0.244	0.236	1	0.236	0.0018
48	52.167	862.4	m-xylene	6.413	6.565	6.489	1	6.489	0.0487
49	52.269	863.4	p-xylene	2.49	2.487	2.488	1	2.488	0.0187
50	52.638	867.1	4-methyloctane	0.452	0.477	0.464	1	0.464	0.0035

Table A16. Sample #16 (Semi gloss lacquer top coat) (Continued).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Reponse Factor	Adjusted Area	Fraction
51	52.944	870.2	methyl amyl ketone	3.597	3.617	3.607	0.77	4.684	0.0352
52	53.334	874.2	3-methyloctane	0.413	0.402	0.408	1	0.408	0.0031
53	54.074	881.7	trans, cis-1,2,4-trimethylcyclohexane	0.22	0.233	0.226	1	0.226	0.0017
54	54.471	885.7	o-xylene	1.534	1.563	1.548	1	1.548	0.0116
55	54.754	888.6	1,2,3-trimethylcyclohexane	0.07	0.075	0.072	1	0.072	0.0005
56	54.829	889.3	1-methyl-2-propylcyclopentane	0.097	0.119	0.108	1	0.108	0.0008
57	54.979	890.9	1,1,2-trimethylcyclohexane	0.026	0.028	0.027	1	0.027	0.0002
58	55.132	892.4	cis-1-ethyl-3-methylcyclohexane	0.201	0.208	0.204	1	0.204	0.0015
59	55.392	895.0	trans-1-ethyl-3-methylcyclohexane	0.083	0.094	0.088	1	0.088	0.0007
60	55.882	900.0	isobutyl isobutyrate	10.265	10.284	10.274	0.67	15.335	0.1151
61	55.882	900.0	nonane	0.497	0.498	0.498	1	0.498	0.0037
62	56.501	906.9	trans-1-ethyl-2-methylcyclohexane	0.019	0.032	0.026	1	0.026	0.0002
63	56.819	910.5	cis, trans-1,2,3-trimethylcyclohexane	0.037	0.052	0.045	1	0.045	0.0003
64	57.028	912.9	trans-1-ethyl-4-methylcyclohexane	0.12	0.134	0.127	1	0.127	0.0010
65	57.288	915.8	cis-1-ethyl-4-methylcyclohexane	0.035	0.026	0.031	1	0.031	0.0002
66	57.534	918.5	isopropylbenzene	0.033	0.046	0.040	1	0.040	0.0003
67	58.26	926.7	2,5-dimethyloctane	0.068	0.027	0.048	1	0.048	0.0004
									0.0000
				100.0	100.0	99.984		133.229	1.0000
						Fraction Identified =			0.9999

Table A17. Sample #17 (White Lacquer).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Reponse Factor	Adjusted Area	Fraction
1	14.752	400.0	methanol	0.321	0.298	0.309	0.35	0.884	0.0066
2	17.302	463.8	acetone	5.570	5.683	5.627	0.525	10.717	0.0798
3	17.725	474.3	isopropyl alcohol	9.606	9.245	9.426	0.54	17.455	0.1300
4	23.205	568.0	methyl ethyl ketone	5.789	5.828	5.808	0.63	9.219	0.0686
5	26.426	611.3	isobutyl alcohol	2.459	2.393	2.426	0.68	3.568	0.0266
6	29.756	644.9	butyl alcohol	5.495	5.385	5.440	0.7	7.772	0.0579
7	30.618	653.6	OTHER C7	0.057	0.040	0.049	1	0.049	0.0004
8	31.118	658.6	cyclohexane	0.348	0.355	0.351	1	0.351	0.0026
9	31.764	665.1	2-methylhexane	0.921	0.937	0.929	1	0.929	0.0069
10	32.035	667.8	2,3-dimethylpentane	0.398	0.401	0.400	1	0.400	0.0030
11	32.453	672.1	1,1-dimethylcyclopentane	0.150	0.147	0.149	1	0.149	0.0011
12	32.693	674.5	3-methylhexane	1.313	1.343	1.328	1	1.328	0.0099
13	33.528	682.9	trans-1,3-dimethylcyclopentane	0.444	0.460	0.452	1	0.452	0.0034
14	33.824	685.9	cis-1,3-dimethylcyclopentane	0.571	0.593	0.582	1	0.582	0.0043
15	34.114	688.8	1,2-dimethylcyclopentane	0.872	0.898	0.885	1	0.885	0.0066
16	34.908	696.8	OTHER C7	0.053	0.048	0.051	1	0.051	0.0004
17	35.225	700.0	heptane	4.431	4.527	4.479	1	4.479	0.0333
18	37.466	720.9	methyl isobutyl ketone	6.181	6.103	6.142	0.75	8.189	0.0610
19	37.74	723.5	methylcyclohexane	6.719	6.900	6.809	1	6.809	0.0507
20	37.97	725.6	1,1,3-trimethylcyclopentane	0.507	0.508	0.508	1	0.508	0.0038
21	38.72	732.6	2,4-dimethylhexane	0.291	0.291	0.291	1	0.291	0.0022
22	38.899	734.3	2,5-dimethylhexane	0.530	0.619	0.574	1	0.574	0.0043
23	38.961	734.9	1,2,4-trimethylcyclopentane	0.352	0.352	0.352	1	0.352	0.0026
24	39.779	742.5	1,2,4-trimethylcyclopentane	0.572	0.587	0.580	1	0.580	0.0043
25	40.563	749.8	1,2,3-trimethylcyclopentane	0.497	0.509	0.503	1	0.503	0.0037

Table A17. Sample #17 (White Lacquer) (Continued).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Reponse Factor	Adjusted Area	Fraction
26	40.822	752.3	2,3,4-trimethylpentane	0.066	0.074	0.070	1	0.070	0.0005
27	41.357	757.2	toluene	19.067	19.328	19.197	1	19.197	0.1429
28	41.863	762.0	2,3-dimethylhexane	0.142	0.149	0.146	1	0.146	0.0011
29	42.067	763.9	3-ethyl-2-methylpentane	0.050	0.053	0.052	1	0.052	0.0004
31	42.387	766.9	2-methylheptane	0.860	0.984	0.922	1	0.922	0.0069
32	42.562	768.5	4-methylheptane	0.215	0.232	0.224	1	0.224	0.0017
33	42.876	771.4	3,4-dimethylhexane	0.045	0.059	0.052	1	0.052	0.0004
34	43.217	774.6	3-methylheptane	0.411	0.427	0.419	1	0.419	0.0031
35	43.378	776.1	3-ethylhexane	0.112	0.122	0.117	1	0.117	0.0009
36	43.802	780.1	cis-1,3-dimethylcyclohexane	0.570	0.614	0.592	1	0.592	0.0044
37	44.007	782.0	trans-1,4-dimethylcyclohexane	0.207	0.216	0.212	1	0.212	0.0016
38	44.698	788.4	1,1-dimethylcyclohexane	0.061	0.067	0.064	1	0.064	0.0005
39	44.854	789.9	cis-1-ethyl-3-methylcyclopentane	0.028	0.028	0.028	1	0.028	0.0002
40	45.072	791.9	trans-1-ethyl-3-methylcyclopentane	0.023	0.028	0.026	1	0.026	0.0002
41	45.222	793.3	cis-1-ethyl-2-methylcyclopentane	0.046	0.055	0.051	1	0.051	0.0004
42	45.441	795.4	butyl acetate	3.252	3.189	3.221	0.61	5.280	0.0393
43	45.936	800.0	octane	0.839	0.847	0.843	1	0.843	0.0063
44	46.637	807.1	trans-1,3-dimethylcyclohexane	0.188	0.195	0.192	1	0.192	0.0014
45	48.048	821.4	2,2,5-trimethylhexane	0.038	0.026	0.032	1	0.032	0.0002
46	48.443	825.4	2,4-dimethylheptane	0.049	0.052	0.051	1	0.051	0.0004
47	49.083	831.9	cis-1,2-dimethylcyclohexane	0.156	0.128	0.142	1	0.142	0.0011
48	49.475	835.9	cis, cis-1,3,5-trimethylcyclohexane	0.120	0.133	0.127	1	0.127	0.0009
49	49.585	837.0	ethylcyclohexane	0.248	0.233	0.240	1	0.240	0.0018
50	49.772	838.9	2,5-dimethylheptane	0.078	0.066	0.072	1	0.072	0.0005

Table A17. Sample #17 (White Lacquer) (Continued).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Reponse Factor	Adjusted Area	Fraction
51	50.131	842.6	1,1,3-trimethylcyclohexane	0.142	0.142	0.142	1	0.142	0.0011
52	50.425	845.5	1,1,4-trimethylcyclohexane	0.036	0.030	0.033	1	0.033	0.0002
53	50.699	848.3	OTHER C9	0.017	0.015	0.016	1	0.016	0.0001
54	51.261	854.0	ethylbenzene	0.534	0.538	0.536	1	0.536	0.0040
55	51.652	858.0	trans, trans-1,2,4-trimethylcyclohexane	0.297	0.296	0.296	1	0.296	0.0022
56	52.085	862.4	m-xylene	1.547	1.478	1.513	1	1.513	0.0113
57	52.192	863.5	p-xylene	0.557	0.535	0.546	1	0.546	0.0041
58	52.512	866.7	4-methyloctane	0.043	0.111	0.077	1	0.077	0.0006
59	52.583	867.4	2-methyloctane	0.070	0.021	0.046	1	0.046	0.0003
60	52.877	870.4	cis-bicyclo[3.3.0]octane	0.014	0.061	0.038	1	0.038	0.0003
63	54.026	882.1	trans, cis-1,2,4-trimethylcyclohexane	0.167	0.175	0.171	1	0.171	0.0013
64	54.402	885.9	o-xylene	0.738	0.732	0.735	1	0.735	0.0055
65	54.748	889.4	2-butoxyethanol	11.594	11.262	11.428	0.58	19.703	0.1467
66	55.073	892.7	cis-1-ethyl-3-methylcyclohexane	0.066	0.099	0.082	1	0.082	0.0006
67	55.321	895.2	trans-1-ethyl-3-methylcyclohexane	0.037	0.030	0.034	1	0.034	0.0003
68	55.794	900.0	isobutyl isobutyrate	2.799	2.695	2.747	0.67	4.100	0.0305
69	56.757	909.8	cis, trans-1,2,3-trimethylcyclohexane	0.018	0.024	0.021	1	0.021	0.0002
									0.0000
				100.000	100.000	100.000		134.313	1.0000
						Fraction Identified =			0.9991

Table A18. Sample #18 (White Sanding Sealer).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Reponse Factor	Adjusted Area	Fraction
1	14.742	400.0	methanol	0.308	0.268	0.288	0.35	0.822	0.0063
2	17.292	463.5	acetone	6.360	5.992	6.176	0.525	11.763	0.0906
3	17.716	474.0	isopropyl alcohol	9.624	8.917	9.271	0.54	17.168	0.1322
4	23.204	567.4	methyl ethyl ketone	6.175	5.915	6.045	0.63	9.596	0.0739
5	26.432	610.9	isobutyl alcohol	1.981	1.990	1.985	0.68	2.919	0.0225
6	28.032	627.1	methylcyclopentane	0.043	0.015	0.029	1	0.029	0.0002
7	29.767	644.7	butyl alcohol	6.439	6.564	6.502	0.7	9.288	0.0715
8	30.627	653.4	2,4-dimethylpentane	0.050	0.044	0.047	1	0.047	0.0004
9	31.126	658.4	cyclohexane	0.443	0.438	0.440	1	0.440	0.0034
10	31.775	665.0	2-methylhexane	1.182	1.161	1.172	1	1.172	0.0090
11	32.045	667.7	2,3-dimethylpentane	0.508	0.497	0.503	1	0.503	0.0039
12	32.466	672.0	1,1-dimethylcyclopentane	0.183	0.180	0.182	1	0.182	0.0014
13	32.705	674.4	3-methylhexane	1.671	1.650	1.660	1	1.660	0.0128
14	33.54	682.8	trans-1,3-dimethylcyclopentane	0.559	0.553	0.556	1	0.556	0.0043
15	33.836	685.8	cis-1,3-dimethylcyclopentane	0.716	0.713	0.714	1	0.714	0.0055
16	34.127	688.8	1,2-dimethylcyclopentane	1.082	1.071	1.076	1	1.076	0.0083
17	34.926	696.8	OTHER C7	0.053	0.054	0.054	1	0.054	0.0004
18	35.239	700.0	heptane	5.284	5.258	5.271	1	5.271	0.0406
19	37.483	720.9	methyl isobutyl ketone	7.111	7.146	7.129	0.75	9.505	0.0732
20	37.756	723.5	methylcyclohexane	7.459	7.552	7.505	1	7.505	0.0578
21	37.986	725.6	1,1,3-trimethylcyclopentane	0.547	0.562	0.554	1	0.554	0.0043
22	38.736	732.6	2,4-dimethylhexane	0.334	0.325	0.329	1	0.329	0.0025
23	38.915	734.3	2,5-dimethylhexane	1.107	1.113	1.110	1	1.110	0.0085
24	39.797	742.5	1,2,4-trimethylcyclopentane	0.630	0.645	0.638	1	0.638	0.0049
25	40.582	749.8	1,2,3-trimethylcyclopentane	0.548	0.561	0.554	1	0.554	0.0043

Table A18. Sample #18 (White Sanding Sealer) (Continued).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Reponse Factor	Adjusted Area	Fraction
26	40.859	752.4	2,3,4-trimethylpentane	0.075	0.085	0.080	1	0.080	0.0006
27	41.379	757.3	toluene	22.042	22.470	22.256	1	22.256	0.1714
28	41.879	761.9	2,3-dimethylhexane	0.154	0.156	0.155	1	0.155	0.0012
29	42.088	763.9	3-ethyl-2-methylpentane	0.057	0.056	0.057	1	0.057	0.0004
30	42.407	766.9	2-methylheptane	0.864	0.997	0.931	1	0.931	0.0072
31	42.587	768.5	4-methylheptane	0.230	0.229	0.230	1	0.230	0.0018
32	42.878	771.3	3,4-dimethylhexane	0.058	0.054	0.056	1	0.056	0.0004
33	43.238	774.6	3-methylheptane	0.383	0.404	0.393	1	0.393	0.0030
34	43.394	776.1	3-ethylhexane	0.108	0.116	0.112	1	0.112	0.0009
35	43.823	780.1	cis-1,3-dimethylcyclohexane	0.500	0.552	0.526	1	0.526	0.0040
36	44.023	781.9	trans-1,4-dimethylcyclohexane	0.169	0.192	0.181	1	0.181	0.0014
37	44.723	788.5	1,1-dimethylcyclohexane	0.058	0.060	0.059	1	0.059	0.0005
38	44.859	789.7	cis-1-ethyl-3-methylcyclopentane	0.025	0.028	0.027	1	0.027	0.0002
39	45.119	792.2	trans-1-ethyl-3-methylcyclopentane	0.024	0.023	0.024	1	0.024	0.0002
40	45.258	793.5	cis-1-ethyl-2-methylcyclopentane	0.051	0.051	0.051	1	0.051	0.0004
41	45.464	795.4	butyl acetate	3.109	3.180	3.145	0.61	5.155	0.0397
42	45.96	800.0	octane	0.707	0.709	0.708	1	0.708	0.0055
43	46.39	804.4	cis-1,4-dimethylcyclohexane	0.020	0.017	0.019	1	0.019	0.0001
44	46.654	807.0	trans-1,3-dimethylcyclohexane	0.163	0.165	0.164	1	0.164	0.0013
45	48.443	825.2	2,4-dimethylheptane	0.058	0.030	0.044	1	0.044	0.0003
46	49.113	832.0	cis-1,2-dimethylcyclohexane	0.097	0.029	0.063	1	0.063	0.0005
47	49.179	832.6	2,6-dimethylheptane	0.023	0.046	0.035	1	0.035	0.0003
48	49.501	835.9	cis, cis-1,3,5-trimethylcyclohexane	0.105	0.137	0.121	1	0.121	0.0009
49	49.61	837.0	ethylcyclohexane	0.173	0.107	0.140	1	0.140	0.0011
50	49.794	838.9	2,5-dimethylheptane	0.057	0.201	0.129	1	0.129	0.0010

Table A18. Sample #18 (White Sanding Sealer) (Continued).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Reponse Factor	Adjusted Area	Fraction
51	50.16	842.6	1,1,3-trimethylcyclohexane	0.111	0.118	0.114	1	0.114	0.0009
52	51.29	854.0	ethylbenzene	0.499	0.531	0.515	1	0.515	0.0040
53	51.68	858.0	trans, trans-1,2,4-trimethylcyclohexane	0.236	0.250	0.243	1	0.243	0.0019
54	52.114	862.4	m-xylene	1.418	1.402	1.410	1	1.410	0.0109
55	52.221	863.5	p-xylene	0.510	0.522	0.516	1	0.516	0.0040
56	52.601	867.3	2-methyloctane	0.092	0.037	0.065	1	0.065	0.0005
57	53.29	874.3	3-methyloctane	0.085	0.050	0.068	1	0.068	0.0005
58	54.042	881.9	trans, cis-1,2,4-trimethylcyclohexane	0.125	0.143	0.134	1	0.134	0.0010
59	54.432	885.9	o-xylene	0.624	0.657	0.641	1	0.641	0.0049
60	54.727	888.9	2-butoxyethanol	3.585	3.899	3.742	0.58	6.452	0.0497
61	55.093	892.6	cis-1-ethyl-3-methylcyclohexane	0.069	0.077	0.073	1	0.073	0.0006
62	55.823	900.0	isobutyl isobutyrate	2.935	3.034	2.984	0.67	4.454	0.0343
				100.000	100.000	100.000		129.856	1.0000
							Fraction Identified =		0.9996

Table A19. Sample #19 (Cherry Stain).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Reponse Factor	Adjusted Area	Fraction
1	15.03	400.0	methanol	0.678	0.612	0.645	0.35	1.842	0.0138
2	17.646	461.0	acetone	5.652	5.295	5.473	0.525	10.425	0.0779
3	18.082	471.2	isopropyl alcohol	5.222	4.777	4.999	0.54	9.258	0.0691
4	17.683	512.5	dichloromethane	0.071	0.071	0.071	0.154	0.461	0.0034
5	23.725	567.3	methyl ethyl ketone	0.213	0.212	0.213	0.63	0.337	0.0025
6	30.273	644.5	butyl alcohol	2.674	2.632	2.653	0.7	3.790	0.0283
7	31.643	658.4	cyclohexane	0.178	0.164	0.171	1	0.171	0.0013
8	32.293	665.0	2-methylhexane	0.458	0.446	0.452	1	0.452	0.0034
9	32.565	667.7	2,3-dimethylpentane	0.199	0.199	0.199	1	0.199	0.0015
10	32.986	672.0	1,1-dimethylcyclopentane	0.079	0.085	0.082	1	0.082	0.0006
11	33.225	674.4	3-methylhexane	0.776	0.759	0.767	1	0.767	0.0057
12	34.065	682.9	trans-1,3-dimethylcyclopentane	0.369	0.365	0.367	1	0.367	0.0027
13	34.361	685.9	cis-1,3-dimethylcyclopentane	0.490	0.482	0.486	1	0.486	0.0036
14	34.651	688.8	1,2-dimethylcyclopentane	0.775	0.768	0.772	1	0.772	0.0058
15	35.447	696.9	OTHER C7	0.049	0.045	0.047	1	0.047	0.0004
16	35.758	700.0	heptane	4.468	4.396	4.432	1	4.432	0.0331
17	38.28	723.6	methylcyclohexane	9.399	9.366	9.383	1	9.383	0.0701
18	38.508	725.7	1,1,3-trimethylcyclopentane	0.740	0.739	0.739	1	0.739	0.0055
19	39.256	732.7	2,4-dimethylhexane	0.376	0.371	0.373	1	0.373	0.0028
20	39.498	735.0	2,5-dimethylhexane	1.029	1.037	1.033	1	1.033	0.0077
21	40.316	742.6	1,2,4-trimethylcyclopentane	0.774	0.768	0.771	1	0.771	0.0058
22	41.1	749.9	1,2,3-trimethylcyclopentane	0.649	0.640	0.644	1	0.644	0.0048
23	41.365	752.4	2,3,4-trimethylpentane	0.076	0.074	0.075	1	0.075	0.0006
24	41.888	757.3	toluene	17.779	17.799	17.789	1	17.789	0.1328
25	42.391	762.0	2,3-dimethylhexane	0.186	0.189	0.188	1	0.188	0.0014

Table A19. Sample #19 (Cherry Stain) (Continued).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Reponse Factor	Adjusted Area	Fraction
26	42.598	763.9	3-ethyl-2-methylpentane	0.052	0.062	0.057	1	0.057	0.0004
27	42.916	766.9	isobutyl acetate	0.990	1.142	1.066	0.61	1.748	0.0131
28	43.097	768.6	4-methylheptane	0.269	0.262	0.265	1	0.265	0.0020
29	43.418	771.6	3,4-dimethylhexane	0.070	0.069	0.070	1	0.070	0.0005
30	43.746	774.7	3-methylheptane	0.450	0.455	0.452	1	0.452	0.0034
31	43.912	776.2	3-ethylhexane	0.143	0.169	0.156	1	0.156	0.0012
32	44.344	780.3	cis-1,3-dimethylcyclohexane	0.444	0.453	0.448	1	0.448	0.0033
33	44.534	782.0	trans-1,4-dimethylcyclohexane	0.146	0.142	0.144	1	0.144	0.0011
34	45.229	788.5	1,1-dimethylcyclohexane	0.059	0.058	0.058	1	0.058	0.0004
35	45.393	790.1	cis-1-ethyl-3-methylcyclopentane	0.025	0.018	0.021	1	0.021	0.0002
36	45.618	792.2	trans-1-ethyl-3-methylcyclopentane	0.015	0.016	0.015	1	0.015	0.0001
37	45.753	793.4	cis-1-ethyl-2-methylcyclopentane	0.027	0.028	0.028	1	0.028	0.0002
38	45.956	795.3	butyl acetate	3.219	3.212	3.216	0.61	5.271	0.0394
39	46.455	800.0	octane	0.133	0.136	0.134	1	0.134	0.0010
40	47.154	807.1	trans-1,3-dimethylcyclohexane	0.050	0.037	0.043	1	0.043	0.0003
41	51.783	854.0	ethylbenzene	0.208	0.194	0.201	1	0.201	0.0015
42	52.169	857.9	trans, trans-1,2,4-trimethylcyclohexane	0.075	0.063	0.069	1	0.069	0.0005
43	52.438	860.7	2,3-dimethylheptane	0.063	0.063	0.063	1	0.063	0.0005
44	52.597	862.3	m-xylene	0.464	0.533	0.499	1	0.499	0.0037
45	52.683	863.1	p-xylene	0.214	0.214	0.214	1	0.214	0.0016
46	53.077	867.1	2-methyloctane	0.086	0.024	0.055	1	0.055	0.0004
47	53.76	874.1	3-methyloctane	0.083	0.150	0.117	1	0.117	0.0009
48	55.202	888.7	2-butoxyethanol	5.997	6.348	6.173	0.58	10.643	0.0795
49	56.318	900.0	isobutyl isobutyrate	29.742	30.389	30.066	0.67	44.874	0.3351
50	56.318	900.0	nonane	0.663	0.677	0.670	1	0.670	0.0050

Table A19. Sample #19 (Cherry Stain) (Continued).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Reponse Factor	Adjusted Area	Fraction
51	57.27	910.6	cis, trans-1,2,3-trimethylcyclohexane	0.021	0.037	0.029	1	0.029	0.0002
52	57.473	912.9	trans-1-ethyl-4-methylcyclohexane	0.134	0.154	0.144	1	0.144	0.0011
53	57.745	916.0	2,4-dimethyloctane	0.049	0.013	0.031	1	0.031	0.0002
54	57.999	918.8	3,4-dimethyloctane	0.016	0.015	0.015	1	0.015	0.0001
55	58.188	920.9	isopropylbenzene	0.042	0.050	0.046	1	0.046	0.0003
56	58.712	926.8	bicyclo[3.3.0]octane	0.117	0.128	0.123	1	0.123	0.0009
57	58.812	927.9	2,5-dimethyloctane	0.111	0.045	0.078	1	0.078	0.0006
58	58.952	929.5	3,5-dimethyloctane	0.007	0.007	0.007	1	0.007	0.0001
59	59.56	936.3	propylcyclohexane	0.202	0.194	0.198	1	0.198	0.0015
60	59.67	937.5	2,6-dimethyloctane	0.282	0.277	0.280	1	0.280	0.0021
61	60.017	941.4	3,6-dimethyloctane	0.062	0.024	0.043	1	0.043	0.0003
62	60.475	946.5	5-ethyl-2-methylheptane	0.160	0.150	0.155	1	0.155	0.0012
63	60.717	949.2	propylbenzene	0.070	0.072	0.071	1	0.071	0.0005
64	61.041	952.8	2,3-dimethyloctane	0.060	0.026	0.043	1	0.043	0.0003
65	61.32	955.9	1-ethyl-3-methylbenzene	0.111	0.106	0.109	1	0.109	0.0008
66	61.542	958.4	1-ethyl-4-methylbenzene	0.170	0.165	0.167	1	0.167	0.0013
67	65.261	1000.0	decane	0.781	0.850	0.816	1	0.816	0.0061
68	73.46	1100.0	undecane	0.342	0.367	0.354	1	0.354	0.0026
				99.783	99.886	99.835		133.910	1.0000
							Fraction identified =		0.9996

Table A20. Sample #20 (Medium Stain).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Reponse Factor	Adjusted Area	Fraction
1	14.83	400.0	methanol	0.527	0.513	0.520	0.35	1.487	0.0109
2	17.405	464.4	acetone	3.375	3.292	3.333	0.525	6.349	0.0466
3	17.83	475.0	isopropyl alcohol	5.298	5.174	5.236	0.54	9.696	0.0712
4	19.497	510.2	dichloromethane	0.117	0.099	0.108	0.154	0.701	0.0051
5	22.612	557.7	OTHER C6	0.012	0.007	0.010	1	0.010	0.0001
6	22.872	561.7	OTHER C6	0.047	0.007	0.027	1	0.027	0.0002
7	23.393	569.7	methyl ethyl ketone	0.182	0.179	0.180	0.63	0.286	0.0021
8	23.999	578.9	2-methylpentane	0.044	0.042	0.043	1	0.043	0.0003
9	25.38	600.0	hexane	0.075	0.070	0.073	1	0.073	0.0005
10	26.626	612.4	isobutyl alcohol	0.081	0.076	0.079	0.68	0.116	0.0009
11	27.624	622.4	OTHER C7	0.025	0.016	0.021	1	0.021	0.0002
12	27.97	625.8	methylcyclopentane	0.018	0.013	0.016	1	0.016	0.0001
13	28.183	628.0	OTHER C7	0.023	0.019	0.021	1	0.021	0.0002
14	29.915	645.3	butyl alcohol	3.052	3.075	3.063	0.7	4.376	0.0321
15	30.793	654.0	2,4-dimethylpentane	0.018	0.019	0.019	1	0.019	0.0001
16	31.09	657.0	OTHER C7	0.020	0.022	0.021	1	0.021	0.0002
17	31.286	658.9	cyclohexane	0.149	0.146	0.147	1	0.147	0.0011
18	31.933	665.4	2-methylhexane	0.457	0.453	0.455	1	0.455	0.0033
19	32.204	668.1	2,3-dimethylpentane	0.204	0.202	0.203	1	0.203	0.0015
20	32.626	672.3	1,1-dimethylcyclopentane	0.087	0.083	0.085	1	0.085	0.0006
21	32.863	674.7	3-methylhexane	0.802	0.795	0.798	1	0.798	0.0059
22	33.701	683.0	trans-1,3-dimethylcyclopentane	0.369	0.369	0.369	1	0.369	0.0027
23	33.997	686.0	cis-1,3-dimethylcyclopentane	0.499	0.494	0.497	1	0.497	0.0036
24	34.288	688.9	1,2-dimethylcyclopentane	0.781	0.769	0.775	1	0.775	0.0057
25	35.401	700.0	heptane	4.429	4.391	4.410	1	4.410	0.0324

Table A20. Sample #20 (Medium Stain) (Continued).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Reponse Factor	Adjusted Area	Fraction
26	37.924	723.5	methylcyclohexane	8.866	9.046	8.956	1	8.956	0.0658
27	38.148	725.6	1,1,3-trimethylcyclopentane	0.719	0.705	0.712	1	0.712	0.0052
28	38.898	732.6	2,4-dimethylhexane	0.397	0.392	0.394	1	0.394	0.0029
29	39.083	734.3	ethylcyclopentane	0.476	0.491	0.484	1	0.484	0.0036
30	39.144	734.9	2,5-dimethylhexane	0.581	0.558	0.569	1	0.569	0.0042
31	39.959	742.5	1,2,4-trimethylcyclopentane	0.776	0.764	0.770	1	0.770	0.0057
32	40.745	749.8	1,2,3-trimethylcyclopentane	0.633	0.631	0.632	1	0.632	0.0046
33	41.013	752.3	2,3,4-trimethylpentane	0.079	0.077	0.078	1	0.078	0.0006
34	41.553	757.4	toluene	19.894	19.723	19.808	1	19.808	0.1455
35	42.043	762.0	2,3-dimethylhexane	0.201	0.199	0.200	1	0.200	0.0015
36	42.248	763.9	3-ethyl-2-methylpentane	0.061	0.061	0.061	1	0.061	0.0004
37	42.449	765.7	1,1,2-trimethylcyclopentane	0.141	0.152	0.146	1	0.146	0.0011
38	42.567	766.8	isobutyl acetate	1.057	1.178	1.117	0.61	1.832	0.0134
39	42.748	768.5	4-methylheptane	0.279	0.280	0.280	1	0.280	0.0021
40	43.059	771.4	3,4-dimethylhexane	0.068	0.070	0.069	1	0.069	0.0005
41	43.398	774.6	3-methylheptane	0.489	0.501	0.495	1	0.495	0.0036
42	43.565	776.1	3-ethylhexane	0.180	0.186	0.183	1	0.183	0.0013
43	43.994	780.2	cis-1,3-dimethylcyclohexane	0.491	0.508	0.500	1	0.500	0.0037
44	44.192	782.0	trans-1,4-dimethylcyclohexane	0.166	0.170	0.168	1	0.168	0.0012
45	44.877	788.4	1,1-dimethylcyclohexane	0.069	0.068	0.069	1	0.069	0.0005
46	45.022	789.7	cis-1-ethyl-3-methylcyclopentane	0.026	0.028	0.027	1	0.027	0.0002
47	45.628	795.4	butyl acetate	3.832	3.802	3.817	0.61	6.257	0.0459
48	46.122	800.0	octane	0.164	0.162	0.163	1	0.163	0.0012
49	51.453	853.9	ethylbenzene	0.196	0.212	0.204	1	0.204	0.0015
50	51.849	857.9	trans, trans-1,2,4-trimethylcyclohexane	0.063	0.064	0.064	1	0.064	0.0005

Table A20. Sample #20 (Medium Stain) (continued).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Reponse Factor	Adjusted Area	Fraction
51	52.276	862.2	m-xylene	0.553	0.525	0.539	1	0.539	0.0040
52	52.379	863.2	p-xylene	0.226	0.223	0.225	1	0.225	0.0016
53	52.755	867.0	2-methyloctane	0.047	0.052	0.049	1	0.049	0.0004
54	53.453	874.1	3-methyloctane	0.052	0.060	0.056	1	0.056	0.0004
55	54.2	881.7	trans, cis-1,2,4-trimethylcyclohexane	0.065	0.075	0.070	1	0.070	0.0005
56	54.592	885.6	o-xylene	0.150	0.150	0.150	1	0.150	0.0011
57	55.031	890.1	2-butoxyethanol	23.382	23.627	23.505	0.58	40.525	0.2976
58	55.512	894.9	cis, cis-1,2,4-trimethylcyclohexane	0.058	0.055	0.057	1	0.057	0.0004
59	56.015	900.0	isobutyl isobutyrate	11.304	11.096	11.200	0.67	16.716	0.1228
60	56.015	900.0	nonane	0.252	0.247	0.250	1	0.250	0.0018
61	56.613	906.7	trans-1-ethyl-2-methylcyclohexane	0.028	0.025	0.027	1	0.027	0.0002
62	56.934	910.2	cis, trans-1,2,3-trimethylcyclohexane	0.050	0.041	0.045	1	0.045	0.0003
63	57.176	912.9	trans-1-ethyl-4-methylcyclohexane	0.142	0.148	0.145	1	0.145	0.0011
64	57.437	915.9	2,4-dimethyloctane	0.040	0.036	0.038	1	0.038	0.0003
65	57.884	920.8	isopropylbenzene	0.045	0.042	0.043	1	0.043	0.0003
66	58.4	926.6	bicyclo[3.3.0]octane	0.104	0.149	0.127	1	0.127	0.0009
67	58.669	929.6	3,5-dimethyloctane	0.013	0.010	0.012	1	0.012	0.0001
68	58.895	932.1	cis-1-ethyl-2-methylcyclohexane	0.034	0.021	0.028	1	0.028	0.0002
69	59.377	937.5	propylcyclohexane	0.365	0.429	0.397	1	0.397	0.0029
70	61.99	966.6	4-methylnonane	0.052	0.037	0.044	1	0.044	0.0003
71	62.606	973.5	3-methylnonane	0.110	0.105	0.108	1	0.108	0.0008
72	63.683	985.5	2-ethyl-1,3-dimethylcyclohexane	0.036	0.095	0.066	1	0.066	0.0005
73	64.117	990.3	1,2,4-trimethylbenzene	0.120	0.070	0.095	1	0.095	0.0007
74	64.443	994.0	bicyclo[3.3.1]nonane	0.057	0.146	0.102	1	0.102	0.0007
75	64.673	996.5	diethylcyclohexane	0.066	0.120	0.093	1	0.093	0.0007

Table A20. Sample #20 (Medium Stain) (Continued).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Reponse Factor	Adjusted Area	Fraction
76	64.984	1000.0	decane	0.585	0.591	0.588	1	0.588	0.0043
77	65.189	1002.5	methyl propylcyclohexane	0.019	0.029	0.024	1	0.024	0.0002
78	65.404	1005.1	diethylcyclohexane	0.047	0.050	0.048	1	0.048	0.0004
79	65.624	1007.8	1,4-dimethyl-1-ethylcyclohexane	0.038	0.038	0.038	1	0.038	0.0003
80	65.768	1009.5	diethylcyclohexane	0.015	0.014	0.015	1	0.015	0.0001
81	66.046	1012.9	2-ethyl-1,3-dimethylcyclohexane	0.018	0.018	0.018	1	0.018	0.0001
82	66.428	1017.6	1,3-dimethyl-2-isopropylcyclopentane	0.068	0.044	0.056	1	0.056	0.0004
83	66.641	1020.2	2,5-dimethylnonane	0.039	0.025	0.032	1	0.032	0.0002
84	66.78	1021.9	2,4,6-trimethyloctane	0.058	0.038	0.048	1	0.048	0.0004
85	67.095	1025.7	2,6-dimethylnonane	0.189	0.192	0.190	1	0.190	0.0014
86	67.48	1030.4	5-ethyl-3-methyloctane	0.040	0.056	0.048	1	0.048	0.0004
87	67.608	1031.9	3,6-dimethylnonane	0.024	0.039	0.031	1	0.031	0.0002
88	67.873	1035.2	isobutylcyclohexane	0.039	0.033	0.036	1	0.036	0.0003
89	68.309	1040.5	butylcyclohexane	0.101	0.093	0.097	1	0.097	0.0007
90	68.489	1042.7	3,7-dimethylnonane	0.087	0.075	0.081	1	0.081	0.0006
91	68.691	1045.1	4,5-dimethylnonane	0.017	0.031	0.024	1	0.024	0.0002
92	68.909	1047.8	4-ethylnonane	0.050	0.028	0.039	1	0.039	0.0003
93	69.284	1052.4	1,3-dimethyl-5-ethylbenzene	0.041	0.021	0.031	1	0.031	0.0002
94	69.493	1054.9	5-ethyl-2-methyloctane	0.022	0.017	0.020	1	0.020	0.0001
95	69.866	1059.4	5-methyldecane	0.050	0.061	0.056	1	0.056	0.0004
96	70.127	1062.6	4-methyldecane	0.055	0.099	0.077	1	0.077	0.0006
97	70.401	1066.0	trans-decalin	0.045	0.065	0.055	1	0.055	0.0004
98	70.828	1071.2	3-methyldecane	0.046	0.146	0.096	1	0.096	0.0007
99	70.977	1073.0	1,4-dimethyl-2-ethylbenzene	0.058	0.033	0.046	1	0.046	0.0003
100	73.197	1100.0	undecane	0.205	0.198	0.201	1	0.201	0.0015
101	80.997	1200.0	dodecane	0.092	0.025	0.059	1	0.059	0.0004
									0.0000
				100.000	100.000	100.000		136.183	1.0000
							Fraction Identified =		0.9993

Table A21. Sample #21 (Clear Lacquer; Acetone).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Reponse Factor	Adjusted Area	Fraction
1	17.359	465.5	acetone	38.937	39.144	39.041	0.525	74.363	0.4588
2	17.78	476.0	isopropyl alcohol	8.515	8.276	8.396	0.54	15.547	0.0959
3	23.343	570.3	methyl ethyl ketone	0.044	0.048	0.046	0.63	0.073	0.0005
4	25.289	600.0	hexane	0.05	0.047	0.049	1	0.049	0.0003
5	26.513	612.2	isobutyl alcohol	0.31	0.302	0.306	0.68	0.450	0.0028
6	29.837	645.4	butyl alcohol	6.009	5.881	5.945	0.7	8.493	0.0524
7	30.682	653.9	2,4-dimethylpentane	0.019	0.019	0.019	1	0.019	0.0001
8	31.19	659.0	cyclohexane	0.196	0.194	0.195	1	0.195	0.0012
9	31.835	665.4	2-methylhexane	0.416	0.418	0.417	1	0.417	0.0026
10	32.106	668.1	2,3-dimethylpentane	0.168	0.168	0.168	1	0.168	0.0010
11	32.536	672.4	1,1-dimethylcyclopentane	0.057	0.051	0.054	1	0.054	0.0003
12	32.765	674.7	3-methylhexane	0.583	0.586	0.585	1	0.585	0.0036
13	33.602	683.1	trans-1,3-dimethylcyclopentane	0.151	0.151	0.151	1	0.151	0.0009
14	33.895	686.0	cis-1,3-dimethylcyclopentane	0.209	0.209	0.209	1	0.209	0.0013
15	34.189	688.9	1,2-dimethylcyclopentane	0.283	0.287	0.285	1	0.285	0.0018
16	35.297	700.0	heptane	1.751	1.756	1.754	1	1.754	0.0108
17	37.565	721.1	methyl isobutyl ketone	0.045	0.043	0.044	0.75	0.059	0.0004
18	37.816	723.5	methylcyclohexane	2.038	2.149	2.094	1	2.094	0.0129
19	38.797	732.6	2,4-dimethylhexane	0.114	0.123	0.119	1	0.119	0.0007
20	38.981	734.3	ethylcyclopentane	0.159	0.115	0.137	1	0.137	0.0008
21	39.043	734.9	2,5-dimethylhexane	0.171	0.345	0.258	1	0.258	0.0016
22	39.86	742.5	1,2,4-trimethylcyclopentane	0.188	0.191	0.190	1	0.190	0.0012
23	40.645	749.8	1,2,3-trimethylcyclopentane	0.168	0.157	0.163	1	0.163	0.0010
24	40.905	752.2	2,3,4-trimethylpentane	0.029	0.026	0.028	1	0.028	0.0002
25	41.424	757.0	toluene	1.611	1.602	1.607	1	1.607	0.0099
26	41.946	761.9	2,3-dimethylhexane	0.089	0.087	0.088	1	0.088	0.0005

Table A21. Sample #21 (Clear Lacquer; Acetone) (Continued).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Reponse Factor	Adjusted Area	Fraction
27	42.151	763.8	3-ethyl-2-methylpentane	0.034	0.031	0.033	1	0.033	0.0002
28	42.466	766.7	isobutyl acetate	0.568	0.606	0.587	0.61	0.962	0.0059
29	42.648	768.4	4-methylheptane	0.157	0.16	0.159	1	0.159	0.0010
30	42.963	771.4	3,4-dimethylhexane	0.039	0.04	0.040	1	0.040	0.0002
31	43.3	774.5	3-methylheptane	0.331	0.357	0.344	1	0.344	0.0021
32	43.45	775.9	3-ethylhexane	0.064	0.074	0.069	1	0.069	0.0004
33	43.73	778.5	3,3-dimethylhexane	0.018	0.014	0.016	1	0.016	0.0001
34	43.884	779.9	cis-1,3-dimethylcyclohexane	0.852	0.854	0.853	1	0.853	0.0053
35	44.094	781.9	trans-1,4-dimethylcyclohexane	0.308	0.301	0.305	1	0.305	0.0019
36	44.482	785.5	OTHER C8	0.013	0.009	0.011	1	0.011	0.0001
37	44.791	788.4	1,1-dimethylcyclohexane	0.071	0.072	0.072	1	0.072	0.0004
38	44.943	789.8	cis-1-ethyl-3-methylcyclopentane	0.036	0.037	0.037	1	0.037	0.0002
39	45.171	791.9	trans-1-ethyl-3-methylcyclopentane	0.033	0.035	0.034	1	0.034	0.0002
40	45.325	793.4	cis-1-ethyl-2-methylcyclopentane	0.069	0.071	0.070	1	0.070	0.0004
41	45.583	795.8	butyl acetate	19.718	19.416	19.567	0.61	32.077	0.1979
42	46.038	800.0	octane	1.424	1.422	1.423	1	1.423	0.0088
43	46.745	807.2	trans-1,3-dimethylcyclohexane	0.388	0.382	0.385	1	0.385	0.0024
44	47.436	814.2	1-ethyl-1-methylcyclopentane	0.037	0.038	0.038	1	0.038	0.0002
45	47.883	818.7	OTHER C9	0.019	0.017	0.018	1	0.018	0.0001
46	48.101	820.9	2,2,5-trimethylhexane	0.02	0.062	0.041	1	0.041	0.0003
47	48.534	825.3	2,4-dimethylheptane	0.094	0.1	0.097	1	0.097	0.0006
48	49.167	831.7	cis-1,2-dimethylcyclohexane	0.457	0.483	0.470	1	0.470	0.0029
49	49.423	834.3	propylcyclopentane	0.041	0.049	0.045	1	0.045	0.0003
50	49.565	835.8	cis, cis-1,3,5-trimethylcyclohexane	0.275	0.263	0.269	1	0.269	0.0017
51	49.679	836.9	ethylcyclohexane	0.524	0.558	0.541	1	0.541	0.0033
52	49.861	838.8	2,5-dimethylheptane	0.156	0.161	0.159	1	0.159	0.0010

Table A21. Sample #21 (Clear Lacquer; Acetone) (Continued).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Reponse Factor	Adjusted Area	Fraction
53	50.23	842.5	1,1,3-trimethylcyclohexane	0.431	0.449	0.440	1	0.440	0.0027
54	50.52	845.4	1,1,4-trimethylcyclohexane	0.072	0.071	0.072	1	0.072	0.0004
55	50.635	846.6	2,6-dimethyloctane	0.014	0.015	0.015	1	0.015	0.0001
56	50.793	848.2	OTHER C9	0.043	0.042	0.043	1	0.043	0.0003
57	51.358	853.9	ethylbenzene	0.26	0.228	0.244	1	0.244	0.0015
58	51.749	857.9	trans, trans-1,2,4-trimethylcyclohexane	0.604	0.613	0.609	1	0.609	0.0038
59	51.961	860.0	trans, trans-1,3,5-trimethylcyclohexane	0.309	0.234	0.272	1	0.272	0.0017
60	52.182	862.3	m-xylene	0.378	0.399	0.389	1	0.389	0.0024
61	52.286	863.3	p-xylene	0.156	0.168	0.162	1	0.162	0.0010
62	52.67	867.2	2-methyloctane	0.443	0.475	0.459	1	0.459	0.0028
63	53.365	874.3	3-methyloctane	0.368	0.375	0.372	1	0.372	0.0023
64	54.119	881.9	trans, cis-1,2,4-trimethylcyclohexane	0.34	0.349	0.345	1	0.345	0.0021
65	54.496	885.7	o-xylene	0.267	0.28	0.274	1	0.274	0.0017
66	54.785	888.7	cis, trans-1,2,4-trimethylcyclohexane	0.157	0.122	0.140	1	0.140	0.0009
67	54.858	889.4	1,2,3-trimethylcyclohexane	0.068	0.113	0.091	1	0.091	0.0006
68	55.17	892.6	cis-1-ethyl-3-methylcyclohexane	0.204	0.235	0.220	1	0.220	0.0014
69	55.426	895.2	cis, cis-1,2,4-trimethylcyclohexane	0.093	0.104	0.099	1	0.099	0.0006
70	55.903	900.0	isobutyl isobutyrate	5.315	5.269	5.292	0.67	7.899	0.0487
71		900.0	nonane	0.353	0.349	0.351	1	0.351	0.0022
72	56.858	910.7	cis, trans-1,2,3-trimethylcyclohexane	0.043	0.049	0.046	1	0.046	0.0003
73	57.06	913.0	trans-1-ethyl-4-methylcyclohexane	0.102	0.121	0.112	1	0.112	0.0007
74	57.344	916.2	2,4-dimethyloctane	0.023	0.024	0.024	1	0.024	0.0001
75	58.3	926.9	bicyclo[3.3.0]octane	0.046	0.049	0.048	1	0.048	0.0003
76	61.295	960.6	ethyl-3-ethoxypropionate	1.603	1.583	1.593	0.49	3.251	0.0201
									0.0000
				99.748	99.703	99.726		162.083	1.0000
						Fraction Identified =			0.9996

Table A22. Sample #22 (Sealer; Acetone).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Reponse Factor	Adjusted Area	Fraction
1	17.417	465.6	acetone	35.275	35.413	35.344	0.525	67.322	0.4580
2	17.834	476.1	isopropyl alcohol	6.268	6.151	6.210	0.54	11.499	0.0782
3	22.844	561.9	2-methylpentane	0.041	0.044	0.043	1	0.043	0.0003
4	23.962	578.9	3-methylpentane	0.05	0.053	0.052	1	0.052	0.0004
5	25.342	600.0	hexane	0.226	0.22	0.223	1	0.223	0.0015
6	27.59	622.5	OTHER C7	0.045	0.042	0.044	1	0.044	0.0003
7	27.918	625.8	methylcyclopentane	0.156	0.157	0.157	1	0.157	0.0011
8	28.137	627.9	3,3-dimethylpentane	0.091	0.091	0.091	1	0.091	0.0006
9	28.793	634.5	2,2-dimethylpentane	0.019	0.01	0.015	1	0.015	0.0001
10	29.86	645.2	butyl alcohol	2.071	2.081	2.076	0.7	2.966	0.0202
11	30.732	653.9	2,4-dimethylpentane	0.084	0.084	0.084	1	0.084	0.0006
12	31.229	658.9	cyclohexane	0.993	0.994	0.994	1	0.994	0.0068
13	31.876	665.3	2-methylhexane	1.952	1.943	1.948	1	1.948	0.0132
14	32.145	668.0	2,3-dimethylpentane	0.799	0.794	0.797	1	0.797	0.0054
15	32.566	672.2	1,1-dimethylcyclopentane	0.233	0.234	0.234	1	0.234	0.0016
16	32.805	674.6	3-methylhexane	2.734	2.729	2.732	1	2.732	0.0186
17	33.639	683.0	trans-1,3-dimethylcyclopentane	0.689	0.687	0.688	1	0.688	0.0047
18	33.932	685.9	cis-1,3-dimethylcyclopentane	0.948	0.945	0.947	1	0.947	0.0064
19	34.225	688.8	1,2-dimethylcyclopentane	1.288	1.285	1.287	1	1.287	0.0088
20	35.344	700.0	heptane	7.67	7.661	7.666	1	7.666	0.0521
21	37.708	722.1	1,2-dimethylcyclopentane	0.272	0.272	0.272	1	0.272	0.0019
22	37.858	723.5	methylcyclohexane	8.423	8.402	8.413	1	8.413	0.0572

Table A22. Sample #22 (Sealer; Acetone) (Continued).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Reponse Factor	Adjusted Area	Fraction
23	38.08	725.5	1,1,3-trimethylcyclopentane	0.459	0.454	0.457	1	0.457	0.0031
24	38.828	732.5	2,4-dimethylhexane	0.448	0.445	0.447	1	0.447	0.0030
25	39.011	734.2	ethylcyclopentane	0.781	0.775	0.778	1	0.778	0.0053
26	39.07	734.8	2,5-dimethylhexane	0.623	0.623	0.623	1	0.623	0.0042
27	39.888	742.4	1,2,4-trimethylcyclopentane	0.664	0.659	0.662	1	0.662	0.0045
28	40.671	749.7	1,2,3-trimethylcyclopentane	0.532	0.531	0.532	1	0.532	0.0036
29	40.935	752.2	2,3,4-trimethylpentane	0.091	0.088	0.090	1	0.090	0.0006
30	41.464	757.1	toluene	4.732	4.704	4.718	1	4.718	0.0321
31	41.969	761.8	2,3-dimethylhexane	0.219	0.219	0.219	1	0.219	0.0015
32	42.176	763.8	3-ethyl-2-methylpentane	0.096	0.092	0.094	1	0.094	0.0006
33	42.493	766.7	isobutyl acetate	1.05	1.131	1.091	0.61	1.788	0.0122
34	42.674	768.4	4-methylheptane	0.309	0.302	0.306	1	0.306	0.0021
35	42.98	771.3	3,4-dimethylhexane	0.078	0.077	0.078	1	0.078	0.0005
36	43.324	774.5	3-methylheptane	0.533	0.534	0.534	1	0.534	0.0036
37	43.48	776.0	3-ethylhexane	0.132	0.131	0.132	1	0.132	0.0009
38	43.912	780.0	cis-1,3-dimethylcyclohexane	0.758	0.739	0.749	1	0.749	0.0051
39	44.116	781.9	trans-1,4-dimethylcyclohexane	0.265	0.26	0.263	1	0.263	0.0018
40	44.813	788.4	1,1-dimethylcyclohexane	0.068	0.071	0.070	1	0.070	0.0005
41	44.969	789.9	cis-1-ethyl-3-methylcyclopentane	0.039	0.038	0.039	1	0.039	0.0003
42	45.189	791.9	trans-1-ethyl-3-methylcyclopentane	0.033	0.037	0.035	1	0.035	0.0002
43	45.34	793.3	cis-1-ethyl-2-methylcyclopentane	0.07	0.075	0.073	1	0.073	0.0005
44	45.594	795.7	butyl acetate	12.968	12.935	12.952	0.61	21.232	0.1444

Table A22. Sample #22 (Sealer; Acetone) (Continued).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Reponse Factor	Adjusted Area	Fraction
45	46.056	800.0	octane	0.935	0.932	0.934	1	0.934	0.0064
46	46.487	804.4	cis-1,4-dimethylcyclohexane	0.023	0.025	0.024	1	0.024	0.0002
47	46.764	807.1	trans-1,3-dimethylcyclohexane	0.248	0.25	0.249	1	0.249	0.0017
48	47.453	814.1	1-ethyl-1-methylcyclopentane	0.018	0.021	0.020	1	0.020	0.0001
49	47.905	818.7	OTHER C9	0.01	0.013	0.012	1	0.012	0.0001
50	48.162	821.3	2,2,5-trimethylhexane	0.029	0.032	0.031	1	0.031	0.0002
51	48.56	825.3	2,4-dimethylheptane	0.056	0.052	0.054	1	0.054	0.0004
52	49.181	831.5	cis-1,2-dimethylcyclohexane	0.271	0.211	0.241	1	0.241	0.0016
53	49.438	834.1	propylcyclopentane	0.022	0.067	0.045	1	0.045	0.0003
54	49.583	835.6	cis, cis-1,3,5-trimethylcyclohexane	0.137	0.152	0.145	1	0.145	0.0010
55	49.697	836.8	ethylcyclohexane	0.309	0.322	0.316	1	0.316	0.0021
56	49.879	838.6	2,5-dimethylheptane	0.085	0.089	0.087	1	0.087	0.0006
57	50.247	842.3	1,1,3-trimethylcyclohexane	0.27	0.278	0.274	1	0.274	0.0019
58	50.53	845.2	1,1,4-trimethylcyclohexane	0.05	0.044	0.047	1	0.047	0.0003
59	50.815	848.0	OTHER C9	0.028	0.012	0.020	1	0.020	0.0001
60	51.151	851.4	2,6-dimethyloctane	0.013	0.03	0.022	1	0.022	0.0001
61	51.372	853.7	ethylbenzene	0.072	0.053	0.063	1	0.063	0.0004
62	51.765	857.6	trans, trans-1,2,4-trimethylcyclohexane	0.344	0.336	0.340	1	0.340	0.0023
63	51.973	859.7	trans, trans-1,3,5-trimethylcyclohexane	0.124	0.095	0.110	1	0.110	0.0007
64	52.035	860.4	2,3-dimethylheptane	0.053	0.06	0.057	1	0.057	0.0004
65	52.208	862.1	m-xylene	0.052	0.036	0.044	1	0.044	0.0003
66	52.621	866.3	p-xylene	0.08	0.021	0.051	1	0.051	0.0003

Table A22. Sample #22 (Sealer; Acetone) (Continued).

Pk#	Ret Time	Ret Index	Compound	Area %	Area % Duplicate	Area % Average	Reponse Factor	Adjusted Area	Fraction
67	52.68	866.9	2-methyloctane	0.16	0.262	0.211	1	0.211	0.0014
68	53.264	872.8	OTHER C9	0.025	0.034	0.030	1	0.030	0.0002
69	53.376	873.9	3-methyloctane	0.193	0.191	0.192	1	0.192	0.0013
70	53.664	876.8	1,2,3-trimethylcyclohexane	0.012	0.019	0.016	1	0.016	0.0001
71	54.134	881.5	trans, cis-1,2,4-trimethylcyclohexane	0.197	0.193	0.195	1	0.195	0.0013
72	54.505	885.3	o-xylene	0.093	0.096	0.095	1	0.095	0.0006
73	54.793	888.2	cis, trans-1,2,4-trimethylcyclohexane	0.062	0.082	0.072	1	0.072	0.0005
74	54.876	889.0	1,2,3-trimethylcyclohexane	0.065	0.052	0.059	1	0.059	0.0004
75	55.183	892.1	cis-1-ethyl-3-methylcyclohexane	0.122	0.137	0.130	1	0.130	0.0009
76	55.436	894.7	cis, cis-1,2,4-trimethylcyclohexane	0.053	0.057	0.055	1	0.055	0.0004
77	55.962	900.0	nonane	0.265	0.273	0.269	1	0.269	0.0018
78	56.857	910.1	cis, trans-1,2,3-trimethylcyclohexane	0.028	0.025	0.027	1	0.027	0.0002
79	57.077	912.5	trans-1-ethyl-4-methylcyclohexane	0.064	0.067	0.066	1	0.066	0.0004
80	58.296	926.2	bicyclo[3.3.0]octane	0.028	0.017	0.023	1	0.023	0.0002
									0.0000
				99.871	99.848	99.860		146.994	1.0000
						Fraction identified =			0.9993

Appendix B

Supplemental Coatings Sample Analysis for SCAQMD or BAAQMD Performed During 1996-97

Table B1. Sample #1 (Semigloss precatalyzed).

compound	% Run 1	% Run 2	Fraction Run 1	Fraction Run 2	average Fraction
2-butoxyethanol	6.34	6.41	0.9241	0.9249	**0.9245**
2-(2-butoxyethoxy)ethanol	0.52	0.52	0.0759	0.0751	**0.0755**
TOTAL	6.86	6.93	1.0000	1.0000	**1.0000**

Table B2. Sample #2 (Sanding Sealer).

compound	% Run 1	% Run 2	Fraction Run 1	Fraction Run 2	average Fraction
2-butoxyethanol	6.65	6.63	1.0000	1.0000	**1.0000**

Table B3. Sample #3 (Clear Topcoat).

compound	% Run 1	% Run 2	Fraction Run 1	Fraction Run 2	average Fraction
1-methoxy-2-propanol	4.213	4.046	0.4302	0.4185	**0.4244**
1,3-dimethylbenzene	0.028	0.029	0.0029	0.0030	**0.0030**
1,4-dimethylbenzene	0.012	0.012	0.0012	0.0012	**0.0012**
1,2-dimethylbenzene	0.120	0.123	0.0123	0.0128	**0.0125**
isopropylbenzene	0.052	0.053	0.0053	0.0055	**0.0054**
propylbenzene	0.153	0.157	0.0157	0.0163	**0.0160**
1-ethyl-3-methylbenzene	0.614	0.631	0.0627	0.0652	**0.0640**
1-ethyl-4-methylbenzene	0.265	0.272	0.0271	0.0282	**0.0276**
1,3,5-trimethylbenzene	0.342	0.351	0.0349	0.0363	**0.0356**
1-ethyl-2-methylbenzene	0.211	0.216	0.0215	0.0224	**0.0220**
1,2,4-trimethylbenzene	1.040	1.068	0.1062	0.1104	**0.1083**
1,2,3-trimethylbenzene	0.172	0.177	0.0176	0.0183	**0.0180**
dipropylene glycol monomethyl ether	2.571	2.531	0.2625	0.2618	**0.2621**
TOTAL	9.794	9.667	1.0000	1.0000	**1.0000**

Table B4. Sample #4 (Clear acetone stain base).

Solids, %	35.10	35.27	35.31							
			Area %			Area		Fraction		average
	Ret Index	Pk#	Run 1	Run 2	Res Fact	Run 1	Run 2	Run 1	Run 2	**Fraction**
methanol	400.0	1	0.0473	0.0440	0.35	0.1354	0.1260	0.0011	0.0011	**0.0011**
acetone	474.7	2	14.8599	14.9472	0.53	28.1349	28.3002	0.2388	0.2401	**0.2395**
isopropyl alcohol	491.1	3	1.5451	1.5357	0.54	2.8770	2.8594	0.0244	0.0243	**0.0243**
2-butanone	575.9	4	1.7363	1.7531	0.63	2.7561	2.7826	0.0234	0.0236	**0.0235**
ethyl acetate	602.9	5	0.0509	0.0508	0.39	0.1311	0.1308	0.0011	0.0011	**0.0011**
1,3-dimethylcyclopentane	683.2	6	0.0114	0.0120	1	0.0114	0.0120	0.0001	0.0001	**0.0001**
cis-1,3-dimethylcyclopentane	686.1	7	0.0136	0.0123	1	0.0136	0.0123	0.0001	0.0001	**0.0001**
1,2-dimethylcyclopentane	689.0	8	0.0205	0.0207	1	0.0205	0.0207	0.0002	0.0002	**0.0002**
heptane	700.0	9	0.0244	0.0223	1	0.0244	0.0223	0.0002	0.0002	**0.0002**
methylcyclohexane	722.7	10	0.0524	0.0666	1	0.0524	0.0666	0.0004	0.0006	**0.0005**
ethylcyclopentane	733.2	11	0.0124	0.0115	1	0.0124	0.0115	0.0001	0.0001	**0.0001**
1,2,4-trimethylcyclopentane	741.1	12	0.0141	0.0113	1	0.0141	0.0113	0.0001	0.0001	**0.0001**
1,2,3-trimethylcyclopentane	748.2	13	0.0180	0.0194	1	0.0180	0.0194	0.0002	0.0002	**0.0002**
toluene	755.6	14	0.3445	0.3511	1	0.3445	0.3511	0.0029	0.0030	**0.0030**
isobutyl acetate	757.8	15	0.9337	0.9338	0.61	1.5253	1.5254	0.0129	0.0129	**0.0129**
4-methylheptane	770.3	16	0.0712	0.0722	1	0.0712	0.0722	0.0006	0.0006	**0.0006**
3-methylheptane	774.3	17	0.2270	0.2338	1	0.2270	0.2338	0.0019	0.0020	**0.0020**
trans-1,2-dimethylcyclohexane	796.8	18	0.0183	0.0214	1	0.0183	0.0214	0.0002	0.0002	**0.0002**
cis-1,2-dimethylcyclohexane	828.9	19	0.0082	0.0093	1	0.0082	0.0093	0.0001	0.0001	**0.0001**
ethylbenzene	852.6	20	12.3523	12.3402	1	12.3523	12.3402	0.1048	0.1047	**0.1048**
1,3-dimethylbenzene	862.4	21	37.6456	37.7656	1	37.6456	37.7656	0.3195	0.3204	**0.3200**
1,4-dimethylbenzene	863.2	22	10.0666	10.2137	1	10.0666	10.2137	0.0854	0.0867	**0.0861**
3-methyloctane	872.8	23	0.0281	0.0471	1	0.0281	0.0471	0.0002	0.0004	**0.0003**
1,2-dimethylbenzene	885.6	24	16.2269	16.1108	1	16.2269	16.1108	0.1377	0.1367	**0.1372**

Table B4. Sample #4 (Clear acetone stain base) (Continued).

Solids, %	35.10	35.27	35.31							
			Area %			Area		Fraction		**average**
	Ret Index	Pk#	Run 1	Run 2	Res Fact	Run 1	Run 2	Run 1	Run 2	**Fraction**
2-butoxyethanol	890.4	25	1.9501	1.8981	0.58	3.3812	3.2911	0.0287	0.0279	**0.0283**
nonane	900.0	26	0.2730	0.1709	1	0.2730	0.1709	0.0023	0.0015	**0.0019**
isopropylbenzene	917.9	27	0.1635	0.1533	1	0.1635	0.1533	0.0014	0.0013	**0.0013**
propylcyclohexane	935.4	28	0.0259	0.0241	1	0.0259	0.0241	0.0002	0.0002	**0.0002**
2,6-dimethyloctane	936.8	29	0.0395	0.0368	1	0.0395	0.0368	0.0003	0.0003	**0.0003**
3,6-dimethyloctane	945.9	30	0.0261	0.0250	1	0.0261	0.0250	0.0002	0.0002	**0.0002**
propylbenzene	948.8	31	0.1021	0.0989	1	0.1021	0.0989	0.0009	0.0008	**0.0009**
1-ethyl-3-methylbenzene	955.8	32	0.1942	0.1886	1	0.1942	0.1886	0.0016	0.0016	**0.0016**
1-ethyl-4-methylbenzene	958.2	33	0.0862	0.0838	1	0.0862	0.0838	0.0007	0.0007	**0.0007**
4-methylnonane	963.6	34	0.0867	0.0754	1	0.0867	0.0754	0.0007	0.0006	**0.0007**
2-methylnonane	966.2	35	0.0371	0.0212	1	0.0371	0.0212	0.0003	0.0002	**0.0002**
3-methylnonane	973.1	36	0.0308	0.0279	1	0.0308	0.0279	0.0003	0.0002	**0.0002**
1,2,4-trimethylbenzene	989.9	37	0.0661	0.0605	1	0.0661	0.0605	0.0006	0.0005	**0.0005**
decane	1000.0	38	0.2372	0.2165	1	0.2372	0.2165	0.0020	0.0018	**0.0019**
cis-1,4-diethylcyclohexane	1025.7	39	0.0625	0.0558	1	0.0625	0.0558	0.0005	0.0005	**0.0005**
butylcyclohexane	1040.3	40	0.0252	0.0158	1	0.0252	0.0158	0.0002	0.0001	**0.0002**
3,7-dimethylnonane	1047.8	41	0.0352	0.0432	1	0.0352	0.0432	0.0003	0.0004	**0.0003**
4-ethylnonane	1052.3	42	0.0316	0.0354	1	0.0316	0.0354	0.0003	0.0003	**0.0003**
5-methyldecane	1059.4	43	0.0224	0.0297	1	0.0224	0.0297	0.0002	0.0003	**0.0002**
undecane	1100.0	44	0.1757	0.1329	1	0.1757	0.1329	0.0015	0.0011	**0.0013**
Speciated Total			100	100		117.8177	117.8529	1.0000	1.0000	**1.0000**

Table B5. Sample #5 (W.W. flat lacquer).

Solids, %	23.76	23.71	23.75							
			Area %			Adjusted Area		Fraction		**average**
	Ret Index	Pk#	Run 1	Run 2	Res Fact	Run 1	Run 2	Run 1	Run 2	**Fraction**
methanol	400.0	1	0.1414	0.1410	0.35	0.4052	0.4041	0.0024	0.0024	**0.0024**
acetone	475.2	2	44.9374	44.6857	0.525	85.5950	85.1155	0.5032	0.5008	**0.5020**
isopropyl alcohol	491.1	3	4.5336	4.5169	0.54	8.4415	8.4104	0.0496	0.0495	**0.0496**
2-butanone	575.8	4	13.0396	13.0363	0.63	20.6977	20.6925	0.1217	0.1218	**0.1217**
ethyl acetate	602.6	5	0.0639	0.0639	0.39	0.1637	0.1638	0.0010	0.0010	**0.0010**
isobutyl alcohol	616.7	6	0.0405	0.0384	0.68	0.0596	0.0565	0.0004	0.0003	**0.0003**
cyclohexane	659.1	7	0.0437	0.0386	1	0.0437	0.0386	0.0003	0.0002	**0.0002**
3-methylhexane	674.8	8	0.0363	0.0382	1	0.0363	0.0382	0.0002	0.0002	**0.0002**
1,3-dimethylcyclopentane	683.1	9	0.0519	0.0516	1	0.0519	0.0516	0.0003	0.0003	**0.0003**
cis-1,3-dimethylcyclopentane	686.1	10	0.0606	0.0586	1	0.0606	0.0586	0.0004	0.0003	**0.0004**
1,2-dimethylcyclopentane	689.0	11	0.0844	0.0836	1	0.0844	0.0836	0.0005	0.0005	**0.0005**
heptane	700.0	12	0.0804	0.0810	1	0.0804	0.0810	0.0005	0.0005	**0.0005**
methyl isobutyl ketone	723.5	13	6.7959	6.8039	0.75	9.0058	9.0164	0.0529	0.0531	**0.0530**
1,1,3-trimethylcyclopentane	725.7	14	0.0336	0.0379	1	0.0336	0.0379	0.0002	0.0002	**0.0002**
2,4-dimethylhexane	734.4	15	0.0444	0.0432	1	0.0444	0.0432	0.0003	0.0003	**0.0003**
1,2,4-trimethylcyclopentane	742.5	16	0.0589	0.0591	1	0.0589	0.0591	0.0003	0.0003	**0.0003**
1,2,3-trimethylcyclopentane	749.9	17	0.0815	0.0820	1	0.0815	0.0820	0.0005	0.0005	**0.0005**
toluene	757.5	18	1.7344	1.7568	1	1.7344	1.7568	0.0102	0.0103	**0.0103**
isobutyl acetate	760.2	19	13.9341	14.0417	0.61	22.7633	22.9390	0.1338	0.1350	**0.1344**
2-methylheptane	766.9	20	0.0673	0.0784	1	0.0673	0.0784	0.0004	0.0005	**0.0004**
3-methylheptane	774.7	21	0.0376	0.0387	1	0.0376	0.0387	0.0002	0.0002	**0.0002**
cis-1,3-dimethylcyclohexane	780.1	22	0.0685	0.0673	1	0.0685	0.0673	0.0004	0.0004	**0.0004**
butyl acetate	797.3	23	0.2458	0.2456	0.61	0.4016	0.4012	0.0024	0.0024	**0.0024**
octane	800.0	24	0.1878	0.1939	1	0.1878	0.1939	0.0011	0.0011	**0.0011**

Table B5. Sample #5 (W.W. flat lacquer) (Continued).

Solids, %	23.76	23.71	23.75							
			Area %			Adjusted Area		Fraction		average
	Ret Index	Pk#	Run 1	Run 2	Res Fact	Run 1	Run 2	Run 1	Run 2	Fraction
ethylcyclohexane	836.5	25	0.0451	0.0529	1	0.0451	0.0529	0.0003	0.0003	**0.0003**
ethylbenzene	853.6	26	0.5988	0.6249	1	0.5988	0.6249	0.0035	0.0037	**0.0036**
trans, trans-1,2,4-trimethylcyclohexane	857.1	27	0.0530	0.0527	1	0.0530	0.0527	0.0003	0.0003	**0.0003**
1,3-dimethylbenzene	861.9	28	1.7469	1.7788	1	1.7469	1.7788	0.0103	0.0105	**0.0104**
1,4-dimethylbenzene	863.0	29	0.6726	0.6989	1	0.6726	0.6989	0.0040	0.0041	**0.0040**
cis-bicyclo[3.3.0]octane	871.2	30	0.1026	0.0974	1	0.1026	0.0974	0.0006	0.0006	**0.0006**
1,2-dimethylbenzene	885.0	31	0.8750	0.9051	1	0.8750	0.9051	0.0051	0.0053	**0.0052**
2-butoxyethanol	890.9	32	7.0855	7.0728	0.58	12.2850	12.2631	0.0722	0.0722	**0.0722**
isobutyl isobutyrate	900.0	33	2.2675	2.2882	0.67	3.3843	3.4152	0.0199	0.0201	**0.0200**
2,5-dimethyloctane	928.8	34	0.0447	0.0531	1	0.0447	0.0531	0.0003	0.0003	**0.0003**
1-ethyl-3-methylbenzene	954.9	35	0.0555	0.0435	1	0.0555	0.0435	0.0003	0.0003	**0.0003**
decane	1000.0	36	0.0494	0.0495	1	0.0494	0.0495	0.0003	0.0003	**0.0003**
Speciated Total			100	100		170.1177	169.9435	1.0000	1.0000	**1.0000**

Table B6. Sample #6 (Oak Stain).

Solids, %	17.8	17.8	17.83			
	Ret Index	Pk#	Area %	Res Factor	Adj Area	**Fraction**
isopropyl alcohol	493.0	1	0.915	0.54	1.7028	**0.0164**
2-butanone	576.4	2	0.043	0.63	0.0681	**0.0007**
butyl alcohol	650.3	3	0.684	0.70	0.9769	**0.0094**
2-methylhexane	665.5	4	0.014	1	0.0141	**0.0001**
3-methylhexane	674.7	5	0.032	1	0.0318	**0.0003**
1,3-dimethylcyclopentane	683.0	6	0.016	1	0.0164	**0.0002**
cis-1,3-dimethylcyclopentane	686.0	7	0.023	1	0.0226	**0.0002**
1,2-dimethylcyclopentane	688.9	8	0.034	1	0.0342	**0.0003**
heptane	700.0	9	0.237	1	0.2371	**0.0023**
methylcyclohexane	723.3	10	0.536	1	0.5356	**0.0052**
1,1,3-trimethylcyclopentane	725.5	11	0.039	1	0.0389	**0.0004**
2,5-dimethylhexane	732.5	12	0.021	1	0.0210	**0.0002**
ethylcyclopentane	734.8	13	0.05	1	0.0504	**0.0005**
1,2,4-trimethylcyclopentane	742.3	14	0.037	1	0.0374	**0.0004**
1,2,3-trimethylcyclopentane	749.6	15	0.027	1	0.0272	**0.0003**
toluene	757.3	16	1.653	1	1.6530	**0.0159**
2-methylheptane	766.6	17	0.062	1	0.0624	**0.0006**
4-methylheptane	768.3	18	0.018	1	0.0178	**0.0002**
3-methylheptane	774.3	19	0.03	1	0.0301	**0.0003**
cis-1,3-dimethylcyclohexane	779.7	20	0.034	1	0.0344	**0.0003**
trans-1,2-dimethylcyclohexane	799.6	21	0.029	1	0.0289	**0.0003**
ethylcyclohexane	835.1	22	0.105	1	0.1049	**0.0010**
1,1,3-trimethylcyclohexane	841.8	23	0.054	1	0.0536	**0.0005**
ethylbenzene	853.8	24	2.137	1	2.1365	**0.0206**
trans, trans-1,2,4-trimethylcyclohexane	857.2	25	0.434	1	0.4339	**0.0042**
trans, trans-1,3,5-trimethylcyclohexane	860.2	26	0.116	1	0.1158	**0.0011**
1,3-dimethylbenzene	862.6	27	6.112	1	6.1123	**0.0588**
1,4-dimethylbenzene	863.6	28	2.229	1	2.2291	**0.0214**
4-methyloctane	866.6	29	0.232	1	0.2320	**0.0022**
3-methyloctane	873.8	30	0.279	1	0.2786	**0.0027**
1,2,3-trimethylcyclohexane	878.5	31	0.021	1	0.0211	**0.0002**
trans, cis-1,2,4-trimethylcyclohexane	880.8	32	0.569	1	0.5688	**0.0055**
1,2-dimethylbenzene	885.7	33	3.188	1	3.1881	**0.0307**
cis, trans-1,2,4-trimethylcyclohexane	887.8	34	0.291	1	0.2908	**0.0028**
1,2,3-trimethylcyclohexane	888.7	35	0.184	1	0.1842	**0.0018**
2-butoxyethanol	891.9	36	3.839	0.58	6.6557	**0.0640**
trans-1-methyl-3-ethylcyclohexane	894.3	37	0.453	1	0.4530	**0.0044**
trans-1-methyl-4-ethylcyclohexane	896.7	38	0.099	1	0.0985	**0.0009**

Table B6. Sample #6 (Oak Stain) (Continued).

Solids, %	17.8	17.8	17.83			
	Ret Index	Pk#	Area %	Res Factor	Adj Area	**Fraction**
OTHER C9	898.0	39	0.042	1	0.0421	**0.0004**
nonane	900.0	40	2.575	1	2.5746	**0.0248**
OTHER C10	906.1	41	0.147	1	0.1468	**0.0014**
1,2,3-trimethylcyclohexane	909.5	42	0.366	1	0.3664	**0.0035**
trans-1-methyl-2-ethylcyclohexane	912.2	43	1.239	1	1.2393	**0.0119**
3,4-dimethyloctane	915.0	44	0.3	1	0.2996	**0.0029**
cis-1-methyl-4-ethylcyclohexane	916.5	45	0.071	1	0.0714	**0.0007**
2,4,6-trimethylheptane	918.1	46	0.069	1	0.0686	**0.0007**
isopropylbenzene	920.3	47	0.458	1	0.4576	**0.0044**
OTHER C10	922.4	48	0.041	1	0.0407	**0.0004**
2,4-dimethyloctane	924.2	49	0.136	1	0.1359	**0.0013**
isopropylcyclohexane	925.6	50	0.755	1	0.7553	**0.0073**
3,5-dimethyloctane	927.3	51	0.536	1	0.5364	**0.0052**
2,5-dimethyloctane	929.0	52	0.139	1	0.1391	**0.0013**
2,7-dimethyloctane	931.5	53	0.396	1	0.3958	**0.0038**
propylcyclohexane	935.4	54	1.928	1	1.9281	**0.0186**
2,6-dimethyloctane	937.0	55	1.992	1	1.9916	**0.0192**
3,3,5-trimethylheptane	938.9	56	0.188	1	0.1882	**0.0018**
butylcyclopentane	940.4	57	0.487	1	0.4865	**0.0047**
3,6-dimethyloctane	942.7	58	0.509	1	0.5089	**0.0049**
3-ethyl-2-methylheptane	945.9	59	1.294	1	1.2935	**0.0124**
propylbenzene	948.0	60	0.333	1	0.3330	**0.0032**
2,3-dimethyloctane	949.6	61	0.306	1	0.3058	**0.0029**
4-ethyloctane	952.0	62	0.404	1	0.4036	**0.0039**
1-ethyl-3-methylbenzene	957.9	63	1.561	1	1.5610	**0.0150**
1-ethyl-4-methylbenzene	961.8	64	0.915	1	0.9145	**0.0088**
1,3,5-trimethylbenzene	963.7	65	1.636	1	1.6360	**0.0157**
2-methylnonane	966.2	66	2.817	1	2.8171	**0.0271**
3-ethyloctane	969.6	67	0.634	1	0.6337	**0.0061**
3-methylnonane	972.9	68	1.413	1	1.4133	**0.0136**
1-ethyl-2-methylbenzene	975.2	69	0.105	1	0.1054	**0.0010**
OTHER C10	976.5	70	0.199	1	0.1994	**0.0019**
1,4-dimethyl-1-ethylcyclohexane	980.3	71	0.974	1	0.9736	**0.0094**
cis-1-methyl-3-isopropylcyclohexane	983.0	72	0.615	1	0.6145	**0.0059**
cis-1-methyl-4-isopropylcyclohexane	984.4	73	0.591	1	0.5908	**0.0057**
1-ethyl-1,2-dimethylcyclohexane	986.4	74	0.504	1	0.5037	**0.0048**
1,2,4-trimethylbenzene	989.5	75	1.773	1	1.7726	**0.0171**
trans-1-methyl-4-propylcyclohexane	993.0	76	1.14	1	1.1395	**0.0110**

Table B6. Sample #6 (Oak Stain) (Continued).

Solids, %	17.8	17.8	17.83			
	Ret Index	Pk#	Area %	Res Factor	Adj Area	**Fraction**
trans-1-methyl-3-isopropylcyclohexane	995.5	77	0.489	1	0.4894	**0.0047**
trans-1-methyl-2-isopropylcyclohexane	996.5	78	0.456	1	0.4563	**0.0044**
decane	1000.0	79	7.369	1	7.3694	**0.0709**
trans-1,3-diethylcyclohexane	1004.3	80	0.669	1	0.6692	**0.0064**
trans-1-methyl-2-propylcyclohexane	1006.8	81	0.556	1	0.5557	**0.0053**
cis-1-methyl-3-propylcyclohexane	1008.7	82	0.24	1	0.2404	**0.0023**
cis-1-methyl-4-propylcyclohexane	1012.1	83	0.214	1	0.2143	**0.0021**
cis-1,3-diethylcyclohexane	1014.6	84	0.881	1	0.8806	**0.0085**
cis-1-methyl-2-isopropylcyclohexane	1016.8	85	0.589	1	0.5890	**0.0057**
sec butylcyclohexane	1019.0	86	0.772	1	0.7719	**0.0074**
1,2,3-trimethylbenzene	1021.2	87	0.776	1	0.7762	**0.0075**
2,6-dimethylnonane	1025.3	88	2.002	1	2.0023	**0.0193**
cis-1,4-diethylcyclohexane	1027.4	89	0.206	1	0.2064	**0.0020**
cis-1-methyl-2-propylcyclohexane	1031.2	90	0.954	1	0.9539	**0.0092**
1-methyl-2-isopropylbenzene	1034.2	91	0.748	1	0.7479	**0.0072**
isobutylcyclohexane	1037.4	92	0.578	1	0.5784	**0.0056**
butylcyclohexane	1039.7	93	1.254	1	1.2540	**0.0121**
pentylcyclopentane	1042.3	94	0.894	1	0.8938	**0.0086**
4,5-dimethylnonane	1044.4	95	0.359	1	0.3593	**0.0035**
1,3-diethylbenzene	1047.3	96	0.861	1	0.8613	**0.0083**
1-methyl-4-propylbenzene	1051.9	97	0.678	1	0.6778	**0.0065**
1,3-dimethyl-5-ethylbenzene	1053.3	98	1.063	1	1.0632	**0.0102**
5-methyldecane	1056.8	99	0.285	1	0.2849	**0.0027**
1,2-diethylbenzene	1059.1	100	1.133	1	1.1325	**0.0109**
4-methyldecane	1062.2	101	0.79	1	0.7904	**0.0076**
3-ethylnonane	1065.6	102	0.964	1	0.9644	**0.0093**
2-methyldecane	1067.6	103	0.134	1	0.1336	**0.0013**
trans-decalin	1070.5	104	0.934	1	0.9343	**0.0090**
3-methyldecane	1072.5	105	0.727	1	0.7271	**0.0070**
1,3-dimethyl-4-ethylbenzene	1074.1	106	0.728	1	0.7283	**0.0070**
1,3-dimethyl-2-ethylbenzene	1076.4	107	0.89	1	0.8901	**0.0086**
OTHER C11	1079.8	108	0.142	1	0.1422	**0.0014**
1,2-dimethyl-4-ethylbenzene	1082.5	109	1.838	1	1.8383	**0.0177**
methylindane	1086.5	110	0.314	1	0.3138	**0.0030**
1,4-dimethyl-2-ethylbenzene	1090.2	111	0.21	1	0.2100	**0.0020**
cis-decalin	1092.5	112	0.574	1	0.5739	**0.0055**
ethyl propylcyclohexane	1095.8	113	0.123	1	0.1231	**0.0012**
ethyl propylcyclohexane	1097.4	114	0.102	1	0.1019	**0.0010**

Table B6. Sample #6 (Oak Stain) (Continued).

Solids, %	17.8	17.8	17.83			
	Ret Index	Pk#	Area %	Res Factor	Adj Area	**Fraction**
undecane	1100.0	115	2.631	1	2.6306	**0.0253**
1,2-dimethyl-3-ethylbenzene	1104.8	116	0.555	1	0.5550	**0.0053**
2-methyldecalin	1106.6	117	0.237	1	0.2367	**0.0023**
1-ethyl-4-isopropylbenzene	1109.1	118	0.337	1	0.3368	**0.0032**
1,2,4,5-tetramethylbenzene	1116.8	119	1.195	1	1.1946	**0.0115**
1,2,3,4-tetramethylbenzene	1121.0	120	2.641	1	2.6413	**0.0254**
2-methyldecalin	1125.6	121	0.127	1	0.1272	**0.0012**
3,5-dimethylnonane	1130.2	122	0.364	1	0.3639	**0.0035**
4,5-dimethyldecane	1134.4	123	0.127	1	0.1273	**0.0012**
(2-methylbutyl)cyclohexane	1137.7	124	0.187	1	0.1866	**0.0018**
5-methylindane	1141.5	125	0.625	1	0.6250	**0.0060**
pentylcyclohexane	1144.9	126	0.296	1	0.2955	**0.0028**
4-ethyldecane	1147.8	127	0.144	1	0.1437	**0.0014**
5-ethyldecane	1150.0	128	0.073	1	0.0727	**0.0007**
5-methylundecane	1153.2	129	0.48	1	0.4796	**0.0046**
1,2,3,5-tetramethylbenzene	1155.6	130	0.78	1	0.7795	**0.0075**
4-methylundecane	1160.9	131	0.25	1	0.2503	**0.0024**
2-methylundecane	1165.3	132	0.317	1	0.3168	**0.0030**
3-methylundecane	1172.6	133	0.26	1	0.2602	**0.0025**
ethyl propylcyclohexane	1179.4	134	0.024	1	0.0235	**0.0002**
naphthalene	1188.7	135	0.448	1	0.4476	**0.0043**
5,6-dimethylindane	1195.1	136	0.044	1	0.0436	**0.0004**
dodecane	1200.0	137	0.739	1	0.7389	**0.0071**
pentamethylbenzene	1209.8	138	0.092	1	0.0918	**0.0009**
2,6-dimethylundecane	1216.2	139	0.074	1	0.0742	**0.0007**
Speciated Total			153.5		103.9243	**1.0000**

Table B7. Sample #7 (Sealer).

Solids, %	22.04	22.10	22.08			
	Ret Index	Pk#	Area %	Res Factor	Adj Area	**Fraction**
acetone	474.1	1	3.6126	0.525	6.8811	**0.0537**
isopropyl alcohol	493.1	2	8.0315	0.54	14.9546	**0.1166**
pentane	500.0	3	0.0134	1	0.0134	**0.0001**
OTHER	559.1	4	0.0324	1	0.0324	**0.0003**
OTHER	562.7	5	0.0840	1	0.0840	**0.0007**
2-butanone	576.2	6	9.6624	0.63	15.3371	**0.1196**
2-methylpentane	579.4	7	0.0893	1	0.0893	**0.0007**
hexane	600.0	8	0.2822	1	0.2822	**0.0022**
ethyl acetate	602.6	9	0.0817	1	0.0817	**0.0006**
OTHER C7	622.3	10	0.0850	1	0.0850	**0.0007**
methylcyclopentane	625.6	11	0.2151	1	0.2151	**0.0017**
OTHER C7	627.8	12	0.1356	1	0.1356	**0.0011**
OTHER C7	634.1	13	0.0204	1	0.0204	**0.0002**
OTHER C7	648.9	14	0.0309	1	0.0309	**0.0002**
butyl alcohol	649.9	15	0.0805	0.70	0.1150	**0.0009**
2,4-dimethylpentane	653.5	16	0.1200	1	0.1200	**0.0009**
cyclohexane	658.5	17	1.0876	1	1.0876	**0.0085**
2-methylhexane	665.1	18	1.8632	1	1.8632	**0.0145**
2,3-dimethylpentane	667.7	19	0.7391	1	0.7391	**0.0058**
1,1-dimethylcyclopentane	671.8	20	0.1590	1	0.1590	**0.0012**
3-methylhexane	674.4	21	2.7198	1	2.7198	**0.0212**
3-ethylpentane	682.5	22	0.4694	1	0.4694	**0.0037**
1,3-dimethylcyclopentane	685.4	23	0.7750	1	0.7750	**0.0060**
cis-1,3-dimethylcyclopentane	688.4	24	0.8976	1	0.8976	**0.0070**
heptane	700.0	25	8.3580	1	8.3580	**0.0652**
methylcyclohexane	723.5	26	11.2474	1	11.2474	**0.0877**
1,1,3-trimethylcyclopentane	725.2	27	0.5469	1	0.5469	**0.0043**
2,5-dimethylhexane	732.2	28	0.5219	1	0.5219	**0.0041**
3-ethylpentane	733.9	29	0.5072	1	0.5072	**0.0040**
2,4-dimethylhexane	734.6	30	0.8245	1	0.8245	**0.0064**
1,2,4-trimethylcyclopentane	742.1	31	0.6440	1	0.6440	**0.0050**
1,2,3-trimethylcyclopentane	749.4	32	0.4231	1	0.4231	**0.0033**
2,3,4-trimethylpentane	751.9	33	0.0618	1	0.0618	**0.0005**
toluene	758.2	34	22.8976	1	22.8976	**0.1785**
OTHER C8	759.7	35	0.0253	1	0.0253	**0.0002**
2,3-dimethylhexane	761.6	36	0.2250	1	0.2250	**0.0018**
3-ethyl-2-methylpentane	763.5	37	0.0807	1	0.0807	**0.0006**

Table B7. Sample #7 (Sealer) (Continued).

Solids, %	22.04	22.10	22.08			
	Ret Index	Pk#	Area %	Res Factor	Adj Area	**Fraction**
1,1,2-trimethylcyclopentane	765.3	38	0.0925	1	0.0925	**0.0007**
2-methylheptane	766.6	39	0.9384	1	0.9384	**0.0073**
4-methylheptane	768.2	40	0.2851	1	0.2851	**0.0022**
3,4-dimethylhexane	771.1	41	0.0741	1	0.0741	**0.0006**
3-methylheptane	774.3	42	0.5109	1	0.5109	**0.0040**
3-ethylhexane	775.7	43	0.1501	1	0.1501	**0.0012**
cis-1,3-dimethylcyclohexane	779.7	44	0.5440	1	0.5440	**0.0042**
trans-1,4-dimethylcyclohexane	781.6	45	0.1898	1	0.1898	**0.0015**
1,1-dimethylcyclohexane	788.0	46	0.0503	1	0.0503	**0.0004**
cis-1-ethyl-3-methylcyclopentane	789.5	47	0.0261	1	0.0261	**0.0002**
trans-1-ethyl-3-methylcyclopentar	791.6	48	0.0221	1	0.0221	**0.0002**
cis-1-ethyl-2-methylcyclopentane	793.0	49	0.0429	1	0.0429	**0.0003**
butyl acetate	798.8	50	17.1211	0.61	27.9697	**0.2181**
octane	800.0	51	0.1904	1	0.1904	**0.0015**
cis-1,4-dimethylcyclohexane	806.9	52	0.0757	1	0.0757	**0.0006**
2-butoxyethanol	891.7	53	2.0348	0.58	3.5280	**0.0275**
Speciated Total			122.0794		128.2420	**1.0000**

Table B8. Sample #8 (High Build Lacquer Sealer).

Solids, %	26.12	26.13	26.09			
	Ret Index	Pk#	Area %	Res Factor	Adj Area	**Fraction**
ethanol	447.9	1	0.0767	0.46	0.1667	**0.0014**
acetone	474.3	2	0.1644	0.525	0.3131	**0.0026**
isopropyl alcohol	491.5	3	3.4332	0.54	6.3926	**0.0528**
pentane	500.0	4	0.0355	1	0.0355	**0.0003**
tert-butyl alcohol	516.4	5	0.0136	0.68	0.0200	**0.0002**
OTHER	559.7	6	0.0189	1	0.0189	**0.0002**
2-butanone	576.4	7	9.8486	0.63	15.6327	**0.1291**
ethyl acetate	602.6	8	1.8899	0.39	4.8459	**0.0400**
isobutyl alcohol	616.8	9	0.3003	0.68	0.4420	**0.0036**
butyl alcohol	649.1	10	0.0395	0.70	0.0564	**0.0005**
2,4-dimethylpentane	650.0	11	0.0881	1	0.0881	**0.0007**
cyclohexane	658.8	12	0.0347	1	0.0347	**0.0003**
2-methylhexane	665.3	13	0.2561	1	0.2561	**0.0021**
2,3-dimethylpentane	667.9	14	0.1025	1	0.1025	**0.0008**
1,1-dimethylcyclopentane	672.1	15	0.0471	1	0.0471	**0.0004**
3-methylhexane	674.5	16	0.5728	1	0.5728	**0.0047**
cis-1,3-dimethylcyclopentane	682.8	17	0.2915	1	0.2915	**0.0024**
1,3-dimethylcyclopentane	685.7	18	0.4001	1	0.4001	**0.0033**
1,2-dimethylcyclopentane	688.6	19	0.6233	1	0.6233	**0.0051**
heptane	700.0	20	4.2116	1	4.2116	**0.0348**
methylcyclohexane	723.7	21	9.3093	1	9.3093	**0.0769**
2,5-dimethylhexane	725.5	22	0.6751	1	0.6751	**0.0056**
3-ethylpentane	732.5	23	0.3658	1	0.3658	**0.0030**
ethylcyclopentane	734.2	24	0.3282	1	0.3282	**0.0027**
2,4-dimethylhexane	734.8	25	0.5461	1	0.5461	**0.0045**
1,2,4-trimethylcyclopentane	742.4	26	0.6564	1	0.6564	**0.0054**
1,2,3-trimethylcyclopentane	749.7	27	0.4763	1	0.4763	**0.0039**
2,3,4-trimethylpentane	752.3	28	0.061	1	0.0610	**0.0005**
toluene	759.2	29	42.63	1	42.6302	**0.3520**
isobutyl acetate	761.1	30	11.013	0.61	17.9904	**0.1486**
2,3-dimethylhexane	762.3	31	0.1607	1	0.1607	**0.0013**
3-ethyl-2-methylpentane	764.3	32	0.0556	1	0.0556	**0.0005**
2-methylheptane	766.0	33	0.123	1	0.1230	**0.0010**
4-methylheptane	767.1	34	1.0583	1	1.0583	**0.0087**
3,4-dimethylhexane	768.7	35	0.2876	1	0.2876	**0.0024**
OTHER C8	771.6	36	0.0739	1	0.0739	**0.0006**

Table B8. Sample #8 (High Build Lacquer Sealer) (Continued).

Solids, %	26.12	26.13	26.09			
	Ret Index	Pk#	Area %	Res Factor	Adj Area	**Fraction**
3-methylheptane	774.7	37	0.5495	1	0.5495	**0.0045**
3-ethylhexane	776.2	38	0.1922	1	0.1922	**0.0016**
cis-1,3-dimethylcyclohexane	780.2	39	0.6278	1	0.6278	**0.0052**
trans-1,4-dimethylcyclohexane	782.0	40	0.2181	1	0.2181	**0.0018**
1,1-dimethylcyclohexane	788.4	41	0.0828	1	0.0828	**0.0007**
trans-1-ethyl-3-methylcyclopentane	789.8	42	0.0303	1	0.0303	**0.0003**
cis-1-ethyl-2-methylcyclopentane	792.0	43	0.0278	1	0.0278	**0.0002**
trans-1,2-dimethylcyclohexane	793.4	44	0.0527	1	0.0527	**0.0004**
butyl acetate	797.6	45	1.0987	0.61	1.7949	**0.0148**
octane	800.0	46	0.3191	1	0.3191	**0.0026**
cis-1,4-dimethylcyclohexane	807.0	47	0.1079	1	0.1079	**0.0009**
2,6-dimethylheptane	831.4	48	0.0408	1	0.0408	**0.0003**
cis, cis-1,3,5-trimethylcyclohexane	835.2	49	0.018	1	0.0180	**0.0001**
ethylcyclohexane	836.4	50	0.0413	1	0.0413	**0.0003**
1,1,3-trimethylcyclohexane	841.8	51	0.0336	1	0.0336	**0.0003**
ethylbenzene	853.5	52	0.279	1	0.2790	**0.0023**
trans, trans-1,2,4-trimethylcyclohexane	857.0	53	0.0394	1	0.0394	**0.0003**
1,3-dimethylbenzene	861.8	54	0.7337	1	0.7337	**0.0061**
1,4-dimethylbenzene	862.9	55	0.2711	1	0.2711	**0.0022**
4-methyloctane	866.3	56	0.0304	1	0.0304	**0.0003**
2-heptanone	872.1	57	4.4837	0.77	5.8115	**0.0480**
1,2-dimethylbenzene	885.1	58	0.3381	1	0.3381	**0.0028**
cis, cis-1,2,4-trimethylcyclohexane	890.3	59	0.0506	1	0.0506	**0.0004**
OTHER C9	899.1	60	0.0224	1	0.0224	**0.0002**
nonane	900.0	61	0.0427	1	0.0427	**0.0004**
Speciated Total			126.09		121.1054	**1.0000**

Table B9. Sample #9 (Lacquer Topcoat).

Solids, %	22.26	22.32	22.31			
	Ret Index	Pk#	Area %	Res Factor	Adj Area	**Fraction**
methanol	400.0	1	0.0071	0.35	0.0203	**0.0002**
ethanol	448.0	2	0.007	0.46	0.0152	**0.0001**
2-methylbutane	470.4	3	0.0049	1	0.0049	**0.0000**
acetone	474.9	4	0.024	0.525	0.0457	**0.0004**
isopropyl alcohol	493.1	5	9.399	0.54	17.5009	**0.1368**
tert-butyl alcohol	517.0	6	0.0045	0.68	0.0066	**0.0001**
OTHER C6	529.3	7	0.004	1	0.0040	**0.0000**
OTHER C6	559.0	8	0.0093	1	0.0093	**0.0001**
OTHER C6	562.8	9	0.0366	1	0.0366	**0.0003**
2-butanone	575.8	10	6.0714	0.63	9.6371	**0.0753**
2-methylpentane	579.5	11	0.039	1	0.0390	**0.0003**
3-methylpentane	591.4	12	0.0092	1	0.0092	**0.0001**
hexane	600.0	13	0.1189	1	0.1189	**0.0009**
ethyl acetate	602.5	14	0.1228	0.39	0.3164	**0.0025**
isobutyl alcohol	616.9	15	2.4089	0.68	3.5457	**0.0277**
OTHER C7	622.4	16	0.0349	1	0.0349	**0.0003**
methylcyclopentane	625.7	17	0.0904	1	0.0904	**0.0007**
OTHER C7	627.9	18	0.0552	1	0.0552	**0.0004**
butyl alcohol	651.9	19	11.988	0.7	17.1250	**0.1339**
2,4-dimethylpentane	653.9	20	0.0543	1	0.0543	**0.0004**
cyclohexane	658.8	21	0.4396	1	0.4396	**0.0034**
2-methylhexane	665.4	22	0.7529	1	0.7529	**0.0059**
2,3-dimethylpentane	668.0	23	0.3164	1	0.3164	**0.0025**
1,1-dimethylcyclopentane	672.1	24	0.0635	1	0.0635	**0.0005**
3-methylhexane	674.6	25	1.1027	1	1.1027	**0.0086**
3-ethylpentane	682.8	26	0.1883	1	0.1883	**0.0015**
cis-1,3-dimethylcyclopentane	685.7	27	0.3152	1	0.3152	**0.0025**
1,3-dimethylcyclopentane	688.7	28	0.3608	1	0.3608	**0.0028**
heptane	700.0	29	3.3485	1	3.3485	**0.0262**
1,2-dimethylcyclopentane	721.9	30	0.0824	1	0.0824	**0.0006**
methylcyclohexane	723.6	31	7.2	1	7.2000	**0.0563**
methyl isobutyl ketone	724.9	32	14.082	0.75	18.6614	**0.1459**
2,5-dimethylhexane	732.5	33	0.2179	1	0.2179	**0.0017**
2,4-dimethylhexane	734.2	34	0.1938	1	0.1938	**0.0015**
1,2,4-trimethylcyclopentane	734.8	35	0.3488	1	0.3488	**0.0027**

Table B9. Sample #9 (Lacquer Topcoat) (Continued).

Solids, %	22.26	22.32	22.31			
	Ret Index	Pk#	Area %	Res Factor	Adj Area	**Fraction**
1,2,4-trimethylcyclopentane	742.3	36	0.2802	1	0.2802	**0.0022**
1,2,3-trimethylcyclopentane	746.8	37	0.9067	1	0.9067	**0.0071**
1,2,3-trimethylcyclopentane	749.6	38	0.1955	1	0.1955	**0.0015**
2,3,4-trimethylpentane	752.1	39	0.0315	1	0.0315	**0.0002**
toluene	757.2	40	0.2341	1	0.2341	**0.0018**
2,3-dimethylhexane	759.7	41	0.1606	1	0.1606	**0.0013**
3-ethyl-2-methylpentane	761.7	42	0.1266	1	0.1266	**0.0010**
1,1,2-trimethylcyclopentane	763.6	43	0.0427	1	0.0427	**0.0003**
OTHER C8	765.4	44	0.0584	1	0.0584	**0.0005**
2-methylheptane	766.7	45	0.7556	1	0.7556	**0.0059**
4-methylheptane	768.3	46	0.2235	1	0.2235	**0.0017**
3,4-dimethylhexane	771.2	47	0.0614	1	0.0614	**0.0005**
3-methylheptane	774.4	48	0.5027	1	0.5027	**0.0039**
3-ethylhexane	775.9	49	0.1136	1	0.1136	**0.0009**
3,3-dimethylhexane	778.4	50	0.0195	1	0.0195	**0.0002**
cis-1,3-dimethylcyclohexane	779.8	51	0.9879	1	0.9879	**0.0077**
trans-1,4-dimethylcyclohexane	781.7	52	0.3595	1	0.3595	**0.0028**
OTHER C8	785.4	53	0.0135	1	0.0135	**0.0001**
1,1-dimethylcyclohexane	788.1	54	0.0925	1	0.0925	**0.0007**
cis-1-ethyl-3-methylcyclopentane	789.5	55	0.0459	1	0.0459	**0.0004**
trans-1-ethyl-3-methylcyclopentane	791.7	56	0.0446	1	0.0446	**0.0003**
cis-1-ethyl-2-methylcyclopentane	793.1	57	0.0874	1	0.0874	**0.0007**
butyl acetate	798.1	58	8.1377	0.61	13.2940	**0.1039**
octane	800.0	59	1.5974	1	1.5974	**0.0125**
cis-1,4-dimethylcyclohexane	804.2	60	0.0408	1	0.0408	**0.0003**
cis-1,4-dimethylcyclohexane	806.9	61	0.3928	1	0.3928	**0.0031**
1-ethyl-1-methylcyclopentane	813.9	62	0.0284	1	0.0284	**0.0002**
2,2-dimethylheptane	818.5	63	0.0188	1	0.0188	**0.0001**
2,2,5-trimethylhexane	821.1	64	0.0628	1	0.0628	**0.0005**
2,4-dimethylheptane	825.1	65	0.1047	1	0.1047	**0.0008**
cis-1,2-dimethylcyclohexane	831.5	66	0.4008	1	0.4008	**0.0031**
propylcyclopentane	834.1	67	0.0448	1	0.0448	**0.0004**
cis, cis-1,3,5-trimethylcyclohexane	835.4	68	0.2203	1	0.2203	**0.0017**
ethylcyclohexane	836.6	69	0.501	1	0.5010	**0.0039**

Table B9. Sample #9 (Lacquer Topcoat) (Continued).

Solids, %	22.26	22.32	22.31			
	Ret Index	Pk#	Area %	Res Factor	Adj Area	**Fraction**
2,5-dimethylheptane	838.5	70	0.1773	1	0.1773	**0.0014**
1,1,3-trimethylcyclohexane	842.1	71	0.3451	1	0.3451	**0.0027**
1,1,4-trimethylcyclohexane	845.0	72	0.06	1	0.0600	**0.0005**
2,6-dimethylheptane	847.8	73	0.0388	1	0.0388	**0.0003**
OTHER C9	851.3	74	0.0155	1	0.0155	**0.0001**
ethylbenzene	854.2	75	3.2589	1	3.2589	**0.0255**
trans, trans-1,2,4-trimethylcyclohexane	857.6	76	0.4483	1	0.4483	**0.0035**
trans, trans-1,3,5-trimethylcyclohexane	860.0	77	0.239	1	0.2390	**0.0019**
1,3-dimethylbenzene	863.1	78	9.3606	1	9.3606	**0.0732**
1,4-dimethylbenzene	864.1	79	3.2851	1	3.2851	**0.0257**
4-methyloctane	866.3	80	0.119	1	0.1190	**0.0009**
2-methyloctane	866.9	81	0.1689	1	0.1689	**0.0013**
3-ethylheptane	872.1	82	0.0932	1	0.0932	**0.0007**
3-methyloctane	874.1	83	0.1784	1	0.1784	**0.0014**
trans, cis-1,2,4-trimethylcyclohexane	881.7	84	0.2493	1	0.2493	**0.0019**
1,2-dimethylbenzene	886.2	85	4.3928	1	4.3928	**0.0343**
cis, trans-1,2,4-trimethylcyclohexane	888.2	86	0.1293	1	0.1293	**0.0010**
trans-1-methyl-3-ethylcyclohexane	891.0	87	0.0841	1	0.0841	**0.0007**
cis-1-ethyl-3-methylcyclohexane	892.0	88	0.1709	1	0.1709	**0.0013**
trans-1-ethyl-3-methylcyclohexane	894.6	89	0.0657	1	0.0657	**0.0005**
nonane	900.0	90	0.1911	1	0.1911	**0.0015**
1,2,3-trimethylcyclohexane	909.9	91	0.038	1	0.0380	**0.0003**
trans-1-methyl-2-ethylcyclohexane	912.4	92	0.0865	1	0.0865	**0.0007**
isopropylbenzene	918.5	93	0.0635	1	0.0635	**0.0005**
3,5-dimethyloctane	926.1	94	0.0375	1	0.0375	**0.0003**
propylcyclohexane	935.9	95	0.0217	1	0.0217	**0.0002**
2,6-dimethyloctane	937.2	96	0.0085	1	0.0085	**0.0001**
3-ethyl-2-methylheptane	946.3	97	0.0074	1	0.0074	**0.0001**
propylbenzene	949.2	98	0.048	1	0.0480	**0.0004**
1-ethyl-3-methylbenzene	956.1	99	0.0866	1	0.0866	**0.0007**
1-ethyl-4-methylbenzene	958.5	100	0.0377	1	0.0377	**0.0003**
4-methylnonane	963.8	101	0.0276	1	0.0276	**0.0002**
1-ethyl-2-methylbenzene	973.3	102	0.0054	1	0.0054	**0.0000**
3-methylnonane	975.1	103	0.0116	1	0.0116	**0.0001**
trans-1-methyl-4-propylcyclohexane	989.8	104	0.0272	1	0.0272	**0.0002**
decane	1000.0	105	0.0249	1	0.0249	**0.0002**
Speciated Total			144.62	1	127.9158	**1.0000**

Table B10. Sample #10 (Semigloss Lacquer Topcoat).

Solids, %	25.01	24.71	24.77			
	Ret Index	Pk#	Area %	Res Factor	Adj Area	**Fraction**
ethanol	448.4	1	0.0046	0.46	0.0100	**0.0001**
acetone	474.5	2	0.1786	0.525	0.3402	**0.0026**
isopropyl alcohol	492.8	3	9.1847	0.54	17.0087	**0.1289**
tert-butyl alcohol	516.7	4	0.0063	0.68	0.0093	**0.0001**
propyl alcohol	545.7	5	0.0052	0.62	0.0084	**0.0001**
OTHER C6	559.7	6	0.0075	1	0.0075	**0.0001**
2-butanone	576.4	7	13.838	0.63	21.9657	**0.1665**
3-methylpentane	591.3	8	0.0068	1	0.0068	**0.0001**
hexane	600.0	9	0.005	1	0.0050	**0.0000**
ethyl acetate	602.5	10	0.0931	0.39	0.2399	**0.0018**
isobutyl alcohol	616.7	11	2.0604	0.68	3.0300	**0.0230**
2,4-dimethylpentane	649.1	12	0.0339	1	0.0339	**0.0003**
cyclohexane	650.1	13	0.0692	1	0.0692	**0.0005**
2-methylhexane	667.6	14	0.017	1	0.0170	**0.0001**
heptane	700.0	15	0.0181	1	0.0181	**0.0001**
methylcyclohexane	723.3	16	0.0522	1	0.0522	**0.0004**
ethylcyclopentane	734.8	17	0.0268	1	0.0268	**0.0002**
1,2,4-trimethylcyclopentane	742.3	18	0.0773	1	0.0773	**0.0006**
1,2,3-trimethylcyclopentane	749.5	19	0.0852	1	0.0852	**0.0006**
2,3,4-trimethylpentane	752.0	20	0.0209	1	0.0209	**0.0002**
toluene	758.0	21	17.031	1	17.0307	**0.1291**
isobutyl acetate	760.6	22	11.071	0.61	18.1493	**0.1376**
2,3-dimethylhexane	762.0	23	0.1031	1	0.1031	**0.0008**
3-ethyl-2-methylpentane	763.9	24	0.0374	1	0.0374	**0.0003**
1,1,2-trimethylcyclopentane	765.5	25	0.0563	1	0.0563	**0.0004**
2-methylheptane	766.7	26	1.1843	1	1.1843	**0.0090**
4-methylheptane	768.3	27	0.3366	1	0.3366	**0.0026**
3,4-dimethylhexane	771.2	28	0.0871	1	0.0871	**0.0007**
3-methylheptane	774.5	29	0.9059	1	0.9059	**0.0069**
3-ethylhexane	775.8	30	0.1656	1	0.1656	**0.0013**
3,3-dimethylhexane	778.4	31	0.0497	1	0.0497	**0.0004**
trans-1,3-dimethylcyclohexane	779.8	32	2.5176	1	2.5176	**0.0191**
trans-1,4-dimethylcyclohexane	781.6	33	0.9085	1	0.9085	**0.0069**
OTHER C8	785.2	34	0.0415	1	0.0415	**0.0003**

Table B10. Sample #10 (Semigloss Lacquer Topcoat) (Continued).

Solids, %	25.01	24.71	24.77			
	Ret Index	Pk#	Area %	Res Factor	Adj Area	**Fraction**
1,1-dimethylcyclohexane	787.9	35	0.2279	1	0.2279	**0.0017**
cis-1-ethyl-3-methylcyclopentane	789.3	36	0.1195	1	0.1195	**0.0009**
trans-1-ethyl-3-methylcyclopentane	791.5	37	0.1154	1	0.1154	**0.0009**
cis-1-ethyl-2-methylcyclopentane	792.9	38	0.2311	1	0.2311	**0.0018**
trans-1,2-dimethylcyclohexane	795.8	39	0.0475	1	0.0475	**0.0004**
butyl acetate	797.9	40	8.4806	0.61	13.9026	**0.1054**
octane	800.0	41	4.7604	1	4.7604	**0.0361**
cis-1,4-dimethylcyclohexane	804.1	42	0.1291	1	0.1291	**0.0010**
OTHER C9	806.7	43	1.1963	1	1.1963	**0.0091**
1-ethyl-1-methylcyclopentane	813.6	44	0.0994	1	0.0994	**0.0008**
OTHER C9	818.2	45	0.0667	1	0.0667	**0.0005**
2,2-dimethylheptane	819.8	46	0.0464	1	0.0464	**0.0004**
2,2,5-trimethylhexane	820.9	47	0.1544	1	0.1544	**0.0012**
2,4-dimethylheptane	824.9	48	0.3296	1	0.3296	**0.0025**
OTHER C9	828.4	49	0.0249	1	0.0249	**0.0002**
OTHER C9	830.1	50	0.0536	1	0.0536	**0.0004**
2,6-dimethylheptane	831.4	51	1.3246	1	1.3246	**0.0100**
cis-1,2-dimethylcyclohexane	834.0	52	0.1537	1	0.1537	**0.0012**
2,7-dimethylheptane	835.4	53	0.6933	1	0.6933	**0.0053**
ethylcyclohexane	836.5	54	1.6537	1	1.6537	**0.0125**
2,5-dimethylheptane	838.3	55	0.5775	1	0.5775	**0.0044**
OTHER C9	840.1	56	0.0674	1	0.0674	**0.0005**
1,1,3-trimethylcyclohexane	842.0	57	1.1513	1	1.1513	**0.0087**
1,1,4-trimethylcyclohexane	844.8	58	0.2098	1	0.2098	**0.0016**
OTHER C9	846.1	59	0.0621	1	0.0621	**0.0005**
OTHER C9	847.6	60	0.1229	1	0.1229	**0.0009**
OTHER C9	851.2	61	0.0544	1	0.0544	**0.0004**
ethylbenzene	853.8	62	1.3347	1	1.3347	**0.0101**
trans, trans-1,2,4-trimethylcyclohexane	857.4	63	1.4265	1	1.4265	**0.0108**
trans, trans-1,3,5-trimethylcyclohexane	859.6	64	0.8162	1	0.8162	**0.0062**
1,3-dimethylbenzene	862.4	65	3.3237	1	3.3237	**0.0252**
1,4-dimethylbenzene	863.4	66	1.2675	1	1.2675	**0.0096**
4-methyloctane	866.1	67	0.4243	1	0.4243	**0.0032**
2-methyloctane	866.8	68	0.6054	1	0.6054	**0.0046**
OTHER C9	869.0	69	0.0326	1	0.0326	**0.0002**

Table B10. Sample #10 (Semigloss Lacquer Topcoat) (Continued).

Solids, %	25.01	24.71	24.77			
	Ret Index	Pk#	Area %	Res Factor	Adj Area	**Fraction**
cis-bicyclo[3.3.0]octane	870.5	70	0.0249	1	0.0249	**0.0002**
3-ethylheptane	871.8	71	0.1533	1	0.1533	**0.0012**
3-methyloctane	873.9	72	0.7027	1	0.7027	**0.0053**
1,2,3-trimethylcyclohexane	876.5	73	0.0565	1	0.0565	**0.0004**
trans, cis-1,2,4-trimethylcyclohexane	881.5	74	0.8112	1	0.8112	**0.0061**
1,2-dimethylbenzene	885.7	75	1.7126	1	1.7126	**0.0130**
cis, trans-1,2,4-trimethylcyclohexane	887.9	76	0.4598	1	0.4598	**0.0035**
2-butoxyethanol	891.7	77	2.4205	0.58	4.1967	**0.0318**
trans-1-methyl-4-ethylcyclohexane	894.5	78	0.2464	1	0.2464	**0.0019**
OTHER C9	898.2	79	0.0501	1	0.0501	**0.0004**
isobutyl isobutyrate	900.0	80	0.7821	0.67	1.1673	**0.0088**
1,2,3-trimethylcyclohexane	906.3	81	0.0271	1	0.0271	**0.0002**
1,2,3-trimethylcyclohexane	909.8	82	0.1195	1	0.1195	**0.0009**
cis-1-methyl-3-ethylcyclohexane	912.3	83	0.2892	1	0.2892	**0.0022**
trans-1-methyl-2-ethylcyclohexane	915.2	84	0.0515	1	0.0515	**0.0004**
2,4-dimethyloctane	918.0	85	0.0185	1	0.0185	**0.0001**
isopropylbenzene	918.4	86	0.022	1	0.0220	**0.0002**
3,4-dimethyloctane	920.4	87	0.0155	1	0.0155	**0.0001**
isopropylcyclohexane	925.9	88	0.1259	1	0.1259	**0.0010**
propylcyclohexane	932.4	89	0.012	1	0.0120	**0.0001**
cis-1-methyl-2-ethylcyclohexane	935.7	90	0.0625	1	0.0625	**0.0005**
2,6-dimethyloctane	937.4	91	0.0115	1	0.0115	**0.0001**
3-ethyl-2-methylheptane	946.1	92	0.0074	1	0.0074	**0.0001**
3,6-dimethyloctane	949.0	93	0.0145	1	0.0145	**0.0001**
1-ethyl-3-methylbenzene	955.9	94	0.0217	1	0.0217	**0.0002**
1-ethyl-4-methylbenzene	958.3	95	0.0091	1	0.0091	**0.0001**
5-methylnonane	962.3	96	0.0044	1	0.0044	**0.0000**
1,3,5-trimethylbenzene	963.8	97	0.0059	1	0.0059	**0.0000**
4-methylnonane	966.5	98	0.0083	1	0.0083	**0.0001**
1-ethyl-2-methylbenzene	973.6	99	0.0055	1	0.0055	**0.0000**
1,2,4-trimethylbenzene	990.0	100	0.0064	1	0.0064	**0.0000**
trans-1-methyl-3-isopropylcyclohexane	994.6	101	0.0484	1	0.0484	**0.0004**
decane	1000.0	102	0.0221	1	0.0221	**0.0002**
Speciated Total			149.54		131.9026	**1.0000**

Table B11. Sample #11 (Gloss Lacquer Topcoat).

Solids, %	26.14	26.07	25.98			
	Ret Index	Pk#	Area %	Res Factor	Adj Area	**Fraction**
methanol	400.0	1	0.0031	0.35	0.0089	**0.0001**
ethanol	446.7	2	0.0233	0.46	0.0507	**0.0004**
acetone	474.5	3	0.0128	0.525	0.0244	**0.0002**
isopropyl alcohol	490.8	4	3.5647	0.54	6.6374	**0.0522**
pentane	500.0	5	0.0169	1	0.0169	**0.0001**
tert-butyl alcohol	516.3	6	0.0122	0.68	0.0180	**0.0001**
2-butanone	575.6	7	4.9827	0.63	7.9090	**0.0622**
ethyl acetate	602.4	8	0.9097	0.39	2.3439	**0.0184**
isobutyl alcohol	616.6	9	0.519	0.68	0.7639	**0.0060**
butyl alcohol	651.5	10	10.144	0.7	14.4920	**0.1140**
cyclohexane	658.8	11	0.0184	1	0.0184	**0.0001**
2-methylhexane	665.4	12	0.1739	1	0.1739	**0.0014**
2,3-dimethylpentane	668.0	13	0.0778	1	0.0778	**0.0006**
1,1-dimethylcyclopentane	672.2	14	0.0313	1	0.0313	**0.0002**
3-methylhexane	674.6	15	0.3658	1	0.3658	**0.0029**
cis-1,3-dimethylcyclopentane	682.9	16	0.1742	1	0.1742	**0.0014**
1,3-dimethylcyclopentane	685.8	17	0.242	1	0.2420	**0.0019**
1,2-dimethylcyclopentane	688.7	18	0.3589	1	0.3589	**0.0028**
heptane	700.0	19	2.3075	1	2.3075	**0.0181**
methylcyclohexane	723.4	20	4.8403	1	4.8403	**0.0381**
1,1,3-trimethylcyclopentane	725.4	21	0.3573	1	0.3573	**0.0028**
2,5-dimethylhexane	732.5	22	0.1939	1	0.1939	**0.0015**
2,4-dimethylhexane	734.1	23	0.1689	1	0.1689	**0.0013**
1,2,4-trimethylcyclopentane	734.8	24	0.2932	1	0.2932	**0.0023**
1,2,4-trimethylcyclopentane	742.3	25	0.3566	1	0.3566	**0.0028**
1,2,3-trimethylcyclopentane	749.6	26	0.2647	1	0.2647	**0.0021**
2,3,4-trimethylpentane	752.1	27	0.0354	1	0.0354	**0.0003**
toluene	758.1	28	18.57	1	18.5704	**0.1460**
isobutyl acetate	760.6	29	8.6522	0.61	14.1346	**0.1112**
2,3-dimethylhexane	762.0	30	0.1091	1	0.1091	**0.0009**
3-ethyl-2methylpentane	764.0	31	0.0334	1	0.0334	**0.0003**
1,1,2-trimethylcyclopentane	765.6	32	0.0762	1	0.0762	**0.0006**
2-methylheptane	766.8	33	0.649	1	0.6490	**0.0051**
4-methylheptane	768.5	34	0.1794	1	0.1794	**0.0014**
3,4-dimethylhexane	771.3	35	0.0453	1	0.0453	**0.0004**
3-methylheptane	774.5	36	0.3584	1	0.3584	**0.0028**

Table B11. Sample #11 (Gloss Lacquer Topcoat) (Continued).

Solids, %	26.14	26.07	25.98			
	Ret Index	Pk#	Area %	Res Factor	Adj Area	**Fraction**
3-ethylhexane	776.0	37	0.1111	1	0.1111	**0.0009**
cis-1,3-dimethylcyclohexane	779.9	38	0.4458	1	0.4458	**0.0035**
trans-1,4-dimethylcyclohexane	781.7	39	0.1657	1	0.1657	**0.0013**
1,1-dimethylcyclohexane	788.1	40	0.0581	1	0.0581	**0.0005**
cis-1-ethyl-3-methylcyclopentane	789.6	41	0.0226	1	0.0226	**0.0002**
trans-1-ethyl-3-methylcyclopentane	791.8	42	0.0209	1	0.0209	**0.0002**
cis-1-ethyl-2-methylcyclopentane	793.1	43	0.0389	1	0.0389	**0.0003**
butyl acetate	798.2	44	9.0719	0.61	14.8202	**0.1166**
octane	800.0	45	0.4339	1	0.4339	**0.0034**
cis-1,4-dimethylcyclohexane	806.9	46	0.1109	1	0.1109	**0.0009**
cis-1,2-dimethylcyclohexane	831.5	47	0.0619	1	0.0619	**0.0005**
ethylcyclohexane	835.4	48	0.0435	1	0.0435	**0.0003**
1,1,3-trimethylcyclohexane	836.5	49	0.0873	1	0.0873	**0.0007**
2,5-dimethylheptane	838.5	50	0.031	1	0.0310	**0.0002**
1,1,4-trimethylcyclohexane	842.0	51	0.052	1	0.0520	**0.0004**
ethylbenzene	854.1	52	2.8398	1	2.8398	**0.0223**
trans, trans-1,3,5-trimethylcyclohexane	857.5	53	0.0958	1	0.0958	**0.0008**
2,3-dimethylheptane	860.0	54	0.0435	1	0.0435	**0.0003**
1,3-dimethylbenzene	862.9	55	8.6759	1	8.6759	**0.0682**
1,4-dimethylbenzene	863.9	56	3.2389	1	3.2389	**0.0255**
4-methyloctane	866.2	57	0.0299	1	0.0299	**0.0002**
2-methyloctane	866.9	58	0.0378	1	0.0378	**0.0003**
2-heptanone	872.5	59	3.841	0.77	4.9785	**0.0392**
3-methyloctane	874.1	60	0.0324	1	0.0324	**0.0003**
trans, cis-1,2,4-trimethylcyclohexane	881.7	61	0.0536	1	0.0536	**0.0004**
1,2-dimethylbenzene	886.1	62	4.5658	1	4.5658	**0.0359**
2-butoxyethanol	892.2	63	3.8076	0.58	6.6018	**0.0519**
nonane	900.0	64	0.0348	1	0.0348	**0.0003**
1,2,3-trimethylcyclohexane	909.9	65	0.0058	1	0.0058	**0.0000**
trans-1-methyl-2-ethylcyclohexane	912.3	66	0.0122	1	0.0122	**0.0001**
cis-1-methyl-4-ethylcyclohexane	918.5	67	0.0261	1	0.0261	**0.0002**
propylbenzene	949.2	68	0.0175	1	0.0175	**0.0001**
1-ethyl-3-methylbenzene	956.0	69	0.0233	1	0.0233	**0.0002**
ethyl-3-ethoxypropionate	962.7	70	2.6775	1	2.6775	**0.0211**
1,2,4-trimethylbenzene	989.9	71	0.0106	1	0.0106	**0.0001**
decane	1000.0	72	0.0137	1	0.0137	**0.0001**
4-methyldecane	1064.0	73	0.0257	1	0.0257	**0.0002**
1,2-diethyl-1-methylcyclohexane	1083.7	74	0.0051	1	0.0051	**0.0000**
4-ethyldecane	1152.7	75	0.0082	1	0.0082	**0.0001**
Speciated Total			125.98		127.1549	**1.0000**

Table B12. Sample #12 (Lacquer).

Solids, %	24.80	24.81	24.81			
	Ret Index	Pk#	Area %	Res Factor	Adj Area	**Fraction**
ethanol	448.8	1	0.0033	0.46	0.0072	**0.0000**
acetone	473.9	2	3.8139	0.525	7.2646	**0.0499**
isopropyl alcohol	492.4	3	7.788	0.54	14.5012	**0.0996**
propyl alcohol	545.5	4	0.0048	0.62	0.0078	**0.0001**
2-butanone	575.3	5	0.9711	0.63	1.5414	**0.0106**
hexane	600.0	6	0.0479	1	0.0479	**0.0003**
isobutyl alcohol	616.6	7	0.1005	0.68	0.1478	**0.0010**
OTHER C6	618.5	8	0.0111	1	0.0111	**0.0001**
OTHER C6	622.4	9	0.0238	1	0.0238	**0.0002**
methylcyclopentane	625.7	10	0.2898	1	0.2898	**0.0020**
OTHER C6	627.9	11	0.0642	1	0.0642	**0.0004**
butyl alcohol	649.1	12	0.0311	0.7	0.0444	**0.0003**
2,4-dimethylpentane	653.8	13	0.0283	1	0.0283	**0.0002**
cyclohexane	658.8	14	0.7943	1	0.7943	**0.0055**
2-methylhexane	665.3	15	0.4497	1	0.4497	**0.0031**
2,3-dimethylpentane	668.0	16	0.3545	1	0.3545	**0.0024**
1,1-dimethylcyclopentane	672.1	17	0.3088	1	0.3088	**0.0021**
3-methylhexane	674.6	18	0.737	1	0.7370	**0.0051**
1,3-dimethylcyclopentane	682.9	19	1.0785	1	1.0785	**0.0074**
cis-1,3-dimethylcyclopentane	685.9	20	1.1976	1	1.1976	**0.0082**
1,2-dimethylcyclopentane	688.8	21	1.6774	1	1.6774	**0.0115**
heptane	700.0	22	1.6326	1	1.6326	**0.0112**
1,2-dimethylcyclopentane	722.0	23	0.4722	1	0.4722	**0.0032**
methylcyclohexane	723.5	24	3.5206	1	3.5206	**0.0242**
1,1,3-trimethylcyclopentane	725.5	25	0.7476	1	0.7476	**0.0051**
2,4-dimethylhexane	732.6	26	0.0999	1	0.0999	**0.0007**
ethylcyclopentane	734.2	27	0.8309	1	0.8309	**0.0057**
1,2,4-trimethylcyclopentane	742.4	28	0.8996	1	0.8996	**0.0062**
1,2,3-trimethylcyclopentane	747.2	29	0.0588	1	0.0588	**0.0004**
1,2,3-trimethylcyclopentane	749.8	30	1.249	1	1.2490	**0.0086**

Table B12. Sample #12 (Lacquer) (Continued).

Solids, %	24.80	24.81	24.81			
	Ret Index	Pk#	Area %	Res Factor	Adj Area	Fraction
2,3,4-trimethylpentane	752.3	31	0.0474	1	0.0474	**0.0003**
toluene	757.9	32	10.749	1	10.7490	**0.0738**
isobutyl acetate	762.4	33	47.679	0.61	77.8902	**0.5350**
3-ethyl-2-methylpentane	764.5	34	0.0338	1	0.0338	**0.0002**
2-methylheptane	766.0	35	0.1016	1	0.1016	**0.0007**
2,3-dimethylhexane	767.3	36	0.2195	1	0.2195	**0.0015**
4-methylheptane	768.9	37	0.05	1	0.0500	**0.0003**
3-methylheptane	774.8	38	0.065	1	0.0650	**0.0004**
3-ethylhexane	776.4	39	0.0586	1	0.0586	**0.0004**
cis-1,3-dimethylcyclohexane	780.3	40	0.2329	1	0.2329	**0.0016**
trans-1,4-dimethylcyclohexane	782.0	41	0.0716	1	0.0716	**0.0005**
1,1-dimethylcyclohexane	788.4	42	0.0321	1	0.0321	**0.0002**
cis-1-ethyl-3-methylcyclopentane	789.9	43	0.0235	1	0.0235	**0.0002**
trans-1-ethyl-3-methylcyclopentane	792.0	44	0.0207	1	0.0207	**0.0001**
cis-1-ethyl-2-methylcyclopentane	793.4	45	0.0452	1	0.0452	**0.0003**
trans-1,2-dimethylcyclohexane	797.5	46	0.11	1	0.1100	**0.0008**
octane	800.0	47	0.0679	1	0.0679	**0.0005**
cis-1,4-dimethylcyclohexane	806.0	48	0.0288	1	0.0288	**0.0002**
2,2-dimethylheptane	817.9	49	0.1647	1	0.1647	**0.0011**
1,1,3-trimethylcyclohexane	842.7	50	0.0347	1	0.0347	**0.0002**
1,1,4-trimethylcyclohexane	846.4	51	0.1318	1	0.1318	**0.0009**
ethylbenzene	853.2	52	0.2152	1	0.2152	**0.0015**
1,3-dimethylbenzene	861.4	53	0.5583	1	0.5583	**0.0038**
1,4-dimethylbenzene	862.5	54	0.3258	1	0.3258	**0.0022**
3-ethylheptane	871.0	55	0.0131	1	0.0131	**0.0001**
1,2-dimethylbenzene	884.4	56	0.3128	1	0.3128	**0.0021**
2-butoxyethanol	890.4	57	2.2831	0.58	3.9585	**0.0272**
isobutyl isobutyrate	900.0	58	5.8697	0.67	8.7607	**0.0602**
1,2,3-trimethylcyclohexane	910.9	59	0.0189	1	0.0189	**0.0001**

Table B12. Sample #12 (Lacquer) (Continued).

Solids, %	24.80	24.81	24.81			
	Ret Index	Pk#	Area %	Res Factor	Adj Area	**Fraction**
3,4-dimethyloctane	924.4	60	0.0099	1	0.0099	**0.0001**
propylcyclohexane	934.2	61	0.0202	1	0.0202	**0.0001**
cis-1-methyl-2-ethylcyclohexane	935.8	62	0.0208	1	0.0208	**0.0001**
3,6-dimethyloctane	944.8	63	0.0163	1	0.0163	**0.0001**
1,2-dimethyl-3-ethylcyclohexane	947.6	64	0.0362	1	0.0362	**0.0002**
1-ethyl-3-methylbenzene	954.5	65	0.117	1	0.1170	**0.0008**
1-ethyl-4-methylbenzene	957.0	66	0.0609	1	0.0609	**0.0004**
5-methylnonane	962.3	67	0.0795	1	0.0795	**0.0005**
3-methylnonane	973.5	68	0.0398	1	0.0398	**0.0003**
cis-1-methyl-4-isopropylcyclohexane	988.2	69	0.1831	1	0.1831	**0.0013**
trans-1-methyl-3-propylcyclohexane	998.5	70	0.0862	1	0.0862	**0.0006**
1,2,3-trimethylbenzene	1018.0	71	0.0396	1	0.0396	**0.0003**
cis-1,4-diethylcyclohexane	1024.2	72	0.0105	1	0.0105	**0.0001**
cis-1-methyl-2-propylcyclohexane	1032.0	73	0.0119	1	0.0119	**0.0001**
1,3-diethylbenzene	1046.2	74	0.037	1	0.0370	**0.0003**
OTHER C11	1052.1	75	0.0751	1	0.0751	**0.0005**
2-methyldecane	1064.1	76	0.0189	1	0.0189	**0.0001**
3-methyldecane	1072.8	77	0.031	1	0.0310	**0.0002**
1,4-dimethyl-2-ethylbenzene	1075.1	78	0.0266	1	0.0266	**0.0002**
1,3-dimethyl-2-ethylbenzene	1081.0	79	0.052	1	0.0520	**0.0004**
OTHER C11	1098.4	80	0.0237	1	0.0237	**0.0002**
1,2-dimethyl-3-ethylbenzene	1103.3	81	0.0086	1	0.0086	**0.0001**
1,2,4,5-tetramethylbenzene	1115.2	82	0.0312	1	0.0312	**0.0002**
1,2,3,4-tetramethylbenzene	1119.1	83	0.0419	1	0.0419	**0.0003**
5-methylindane	1139.9	84	0.0159	1	0.0159	**0.0001**
4-ethyldecane	1151.5	85	0.0124	1	0.0124	**0.0001**
1,2,3,5-tetramethylbenzene	1154.0	86	0.0158	1	0.0158	**0.0001**
naphthalene	1186.9	87	0.0264	1	0.0264	**0.0002**
Speciated Total			149.62		145.5792	**1.0000**

Table B13. Sample #13 (high solids water white sanding sealer).

Solids, %	24.26	24.29	24.25							
			Area %			Adjusted Area		Fraction		**Average**
	Ret Index	Pk#	Run 1	Run 2	Res Factor	Run 1	Run 2	Run 1	Run 2	**Fraction**
methanol	412.9	1	0.0047	0.0139	0.35	0.0135	0.0399	0.0001	0.0003	**0.0002**
ethanol	459.1	2	0.0183	0.0161	0.46	0.0398	0.0351	0.0003	0.0003	**0.0003**
isopropyl alcohol	489.0	3	3.7184	3.6856	0.54	6.9236	6.8626	0.0557	0.0553	**0.0555**
tert-butyl alcohol	514.9	4	0.0074	0.0078	0.68	0.0110	0.0115	0.0001	0.0001	**0.0001**
propyl alcohol	539.7	5	0.0080	0.0086	0.62	0.0131	0.0140	0.0001	0.0001	**0.0001**
2-butanone	566.2	6	12.9015	12.7737	0.63	20.4786	20.2758	0.1648	0.1633	**0.1640**
2-methylpentane	579.0	7	0.0093	0.0091	1.00	0.0093	0.0091	0.0001	0.0001	**0.0001**
ethyl acetate	605.2	8	0.0335	0.0332	0.39	0.0863	0.0855	0.0007	0.0007	**0.0007**
OTHER C7	607.0	9	0.1076	0.1054	1.00	0.1076	0.1054	0.0009	0.0008	**0.0009**
isobutyl alcohol	613.0	10	0.0166	0.0167	0.68	0.0244	0.0246	0.0002	0.0002	**0.0002**
methylcyclopentane	619.2	11	0.0271	0.0271	1.00	0.0271	0.0271	0.0002	0.0002	**0.0002**
butyl alcohol	645.5	12	4.8638	4.8697	0.70	6.9483	6.9567	0.0559	0.0560	**0.0560**
2,4-dimethylpentane	648.0	13	0.1427	0.1436	1.00	0.1427	0.1436	0.0011	0.0012	**0.0012**
OTHER C7	653.4	14	0.0259	0.0260	1.00	0.0259	0.0260	0.0002	0.0002	**0.0002**
2-methylhexane	661.2	15	1.7647	1.7522	1.00	1.7647	1.7522	0.0142	0.0141	**0.0142**
2,3-dimethylpentane	664.0	16	0.6809	0.6783	1.00	0.6809	0.6783	0.0055	0.0055	**0.0055**
1,1-dimethylcyclopentane	668.4	17	0.0225	0.0225	1.00	0.0225	0.0225	0.0002	0.0002	**0.0002**
3-methylhexane	671.7	18	2.9535	2.9482	1.00	2.9535	2.9482	0.0238	0.0237	**0.0238**
cis-1,3-dimethylcyclopentane	680.5	19	0.0706	0.0696	1.00	0.0706	0.0696	0.0006	0.0006	**0.0006**

Table B13. Sample #13 (high solids water white sanding sealer) (Continued).

Solids, %	24.26	24.29	24.25							
			Area %			Adjusted Area		Fraction		**Average**
	Ret Index	Pk#	Run 1	Run 2	Res Factor	Run 1	Run 2	Run 1	Run 2	**Fraction**
3-ethylpentane	683.8	20	0.4745	0.4755	1.00	0.4745	0.4755	0.0038	0.0038	**0.0038**
1,3-dimethylcyclopentane	687.1	21	0.1250	0.1239	1.00	0.1250	0.1239	0.0010	0.0010	**0.0010**
cis-1,3-dimethylcyclopentane	693.7	22	0.0130	0.0136	1.00	0.0130	0.0136	0.0001	0.0001	**0.0001**
heptane	700.0	23	1.8592	1.8618	1.00	1.8592	1.8618	0.0150	0.0150	**0.0150**
1,2-dimethylcyclopentane	701.9	24	0.0983	0.1012	1.00	0.0983	0.1012	0.0008	0.0008	**0.0008**
OTHER C8	706.5	25	0.0159	0.0162	1.00	0.0159	0.0162	0.0001	0.0001	**0.0001**
OTHER C8	709.4	26	0.0584	0.0621	1.00	0.0584	0.0621	0.0005	0.0005	**0.0005**
OTHER C8	713.7	27	0.0271	0.0250	1.00	0.0271	0.0250	0.0002	0.0002	**0.0002**
1,2-dimethylcyclopentane	721.2	28	0.4908	0.4893	1.00	0.4908	0.4893	0.0039	0.0039	**0.0039**
methylcyclohexane	722.3	29	0.6305	0.6287	1.00	0.6305	0.6287	0.0051	0.0051	**0.0051**
1,1,3-trimethylcyclopentane	724.7	30	0.0649	0.0750	1.00	0.0649	0.0750	0.0005	0.0006	**0.0006**
2,5-dimethylhexane	732.0	31	0.6757	0.6729	1.00	0.6757	0.6729	0.0054	0.0054	**0.0054**
2,4-dimethylhexane	734.3	32	1.2067	1.3181	1.00	1.2067	1.3181	0.0097	0.0106	**0.0102**
1,2,4-trimethylcyclopentane	742.1	33	0.5300	0.5370	1.00	0.5300	0.5370	0.0043	0.0043	**0.0043**
1,2,4-trimethylcyclopentane	745.3	34	0.0332	0.0376	1.00	0.0332	0.0376	0.0003	0.0003	**0.0003**
1,2,3-trimethylcyclopentane	748.5	35	0.0746	0.0770	1.00	0.0746	0.0770	0.0006	0.0006	**0.0006**
2,3,4-trimethylpentane	751.0	36	0.0899	0.0952	1.00	0.0899	0.0952	0.0007	0.0008	**0.0007**
1,2,3-trimethylcyclopentane	754.2	37	0.0417	0.0438	1.00	0.0417	0.0438	0.0003	0.0004	**0.0003**

Table B13. Sample #13 (high solids water white sanding sealer) (Continued).

Solids, %	24.26	24.29	24.25							
			Area %			Adjusted Area		Fraction		**Average**
	Ret Index	Pk#	Run 1	Run 2	Res Factor	Run 1	Run 2	Run 1	Run 2	**Fraction**
toluene	756.3	38	4.6910	4.6440	1.00	4.6910	4.6440	0.0378	0.0374	**0.0376**
isobutyl acetate	760.6	39	17.8087	17.8578	0.61	29.0929	29.1731	0.2341	0.2349	**0.2345**
3-ethyl-2-methylpentane	762.9	40	0.1454	0.1374	1.00	0.1454	0.1374	0.0012	0.0011	**0.0011**
2-methylheptane	765.9	41	1.3140	1.3515	1.00	1.3140	1.3515	0.0106	0.0109	**0.0107**
4-methylheptane	767.5	42	0.6217	0.6317	1.00	0.6217	0.6317	0.0050	0.0051	**0.0050**
3,4-dimethylhexane	770.1	43	0.1943	0.1974	1.00	0.1943	0.1974	0.0016	0.0016	**0.0016**
3-methylheptane	773.4	44	1.1679	1.2053	1.00	1.1679	1.2053	0.0094	0.0097	**0.0096**
3-ethylhexane	774.6	45	0.3014	0.3038	1.00	0.3014	0.3038	0.0024	0.0024	**0.0024**
cis-1,3-dimethylcyclohexane	778.2	46	0.1202	0.1258	1.00	0.1202	0.1258	0.0010	0.0010	**0.0010**
trans-1,4-dimethylcyclohexane	780.0	47	0.0368	0.0359	1.00	0.0368	0.0359	0.0003	0.0003	**0.0003**
OTHER C8	783.9	48	0.0153	0.0164	1.00	0.0153	0.0164	0.0001	0.0001	**0.0001**
1,1-dimethylcyclohexane	787.8	49	0.0182	0.0186	1.00	0.0182	0.0186	0.0001	0.0002	**0.0001**
cis-1-ethyl-3-methylcyclopentane	789.9	50	0.0189	0.0185	1.00	0.0189	0.0185	0.0002	0.0001	**0.0002**
trans-1-ethyl-3-methylcyclopentane	791.2	51	0.0163	0.0192	1.00	0.0163	0.0192	0.0001	0.0002	**0.0001**
cis-1-ethyl-2-methylcyclopentane	795.8	52	0.0765	0.0788	1.00	0.0765	0.0788	0.0006	0.0006	**0.0006**
trans-1,2-dimethylcyclohexane	798.0	53	0.1671	0.1691	1.00	0.1671	0.1691	0.0013	0.0014	**0.0014**
cis-1,4-dimethylcyclohexane	804.4	54	0.0144	0.0184	1.00	0.0144	0.0184	0.0001	0.0001	**0.0001**
ethylbenzene	852.8	55	6.3858	6.3855	1.00	6.3858	6.3855	0.0514	0.0514	**0.0514**
1,3-dimethylbenzene	862.4	56	19.1848	19.0882	1.00	19.1848	19.0882	0.1544	0.1537	**0.1540**
1,4-dimethylbenzene	863.3	57	5.3846	5.3686	1.00	5.3846	5.3686	0.0433	0.0432	**0.0433**
3-methyloctane	873.1	58	0.0416	0.0441	1.00	0.0416	0.0441	0.0003	0.0004	**0.0003**
1,2-dimethylbenzene	885.1	59	7.9997	8.0140	1.00	7.9997	8.0140	0.0644	0.0645	**0.0645**
1,2,4-trimethylcyclohexane	890.1	60	0.1843	0.1932	1.00	0.1843	0.1932	0.0015	0.0016	**0.0015**
trans-1-methyl-4-ethylcyclohexane	899.2	61	0.0693	0.0734	1.00	0.0693	0.0734	0.0006	0.0006	**0.0006**
nonane	900.0	62	0.1356	0.1422	1.00	0.1356	0.1422	0.0011	0.0011	**0.0011**
Speciated Total			100	100		124.2505	124.1956	1.0000	1.0000	**1.0000**

Table B14. Sample #14 (High solids water gloss).

Solids, %	25.74	25.75	25.75							
			Area %			Adjusted Area		Fraction		**Average**
	Ret Index	Pk#	Run 1	Run 2	Res Fact	Run 1	Run 2	Run 1	Run 2	**Fraction**
ethanol	444.7	1	0.1721	0.1696	0.46	0.3741	0.3687	0.0031	0.0030	**0.0031**
acetone	473.0	2	0.0086	0.0087	0.525	0.0164	0.0166	0.0001	0.0001	**0.0001**
isopropyl alcohol	490.0	3	4.3426	4.3236	0.54	8.0859	8.0504	0.0667	0.0664	**0.0665**
tert-butyl alcohol	515.5	4	0.0066	0.0070	0.68	0.0097	0.0103	0.0001	0.0001	**0.0001**
OTHER C6	562.3	5	0.0057	0.0062	1	0.0057	0.0062	0.0000	0.0001	**0.0000**
2-butanone	576.9	6	12.4772	12.4310	0.63	19.8050	19.7318	0.1634	0.1627	**0.1631**
methylcyclopentane	622.6	7	0.0330	0.0328	1	0.0330	0.0328	0.0003	0.0003	**0.0003**
OTHER C7	628.0	8	0.0526	0.0527	1	0.0526	0.0527	0.0004	0.0004	**0.0004**
butyl alcohol	650.8	9	2.1715	2.1886	0.7	3.1022	3.1265	0.0256	0.0258	**0.0257**
2,4-dimethylpentane	653.6	10	0.1669	0.1675	1	0.1669	0.1675	0.0014	0.0014	**0.0014**
cyclohexane	658.5	11	0.0463	0.0455	1	0.0463	0.0455	0.0004	0.0004	**0.0004**
2-methylhexane	665.4	12	1.5996	1.5940	1	1.5996	1.5940	0.0132	0.0131	**0.0132**
2,3-dimethylpentane	667.9	13	0.6222	0.6223	1	0.6222	0.6223	0.0051	0.0051	**0.0051**
1,1-dimethylcyclopentane	671.9	14	0.0224	0.0221	1	0.0224	0.0221	0.0002	0.0002	**0.0002**
3-methylhexane	674.7	15	2.2110	2.2098	1	2.2110	2.2098	0.0182	0.0182	**0.0182**
1,3-dimethylcyclopentane	682.6	16	0.0620	0.0615	1	0.0620	0.0615	0.0005	0.0005	**0.0005**
cis-1,3-dimethylcyclopentane	685.5	17	0.3044	0.3067	1	0.3044	0.3067	0.0025	0.0025	**0.0025**
1,2-dimethylcyclopentane	688.5	18	0.0896	0.0869	1	0.0896	0.0869	0.0007	0.0007	**0.0007**
heptane	700.0	19	1.5089	1.5150	1	1.5089	1.5150	0.0124	0.0125	**0.0125**

Table B14. Sample #14 (High solids water gloss) (Continued).

Solids, %	25.74	25.75	25.75							
			Area %			Adjusted Area		Fraction		Average
	Ret Index	Pk#	Run 1	Run 2	Res Fact	Run 1	Run 2	Run 1	Run 2	Fraction
methylcyclohexane	721.5	20	0.0276	0.0084	1	0.0276	0.0084	0.0002	0.0001	**0.0001**
methyl isobutyl ketone	725.4	21	19.0772	19.2105	0.75	25.2809	25.4574	0.2086	0.2099	**0.2093**
2,5-dimethylhexane	732.6	22	0.1542	0.1539	1	0.1542	0.1539	0.0013	0.0013	**0.0013**
2,4-dimethylhexane	734.9	23	0.2648	0.3102	1	0.2648	0.3102	0.0022	0.0026	**0.0024**
1,2,4-trimethylcyclopentane	742.8	24	0.1137	0.1167	1	0.1137	0.1167	0.0009	0.0010	**0.0010**
1,2,3-trimethylcyclopentane	747.1	25	0.0131	0.0144	1	0.0131	0.0144	0.0001	0.0001	**0.0001**
1,2,3-trimethylcyclopentane	749.4	26	0.0182	0.0182	1	0.0182	0.0182	0.0002	0.0002	**0.0002**
2,3,4-trimethylpentane	752.0	27	0.0226	0.0248	1	0.0226	0.0248	0.0002	0.0002	**0.0002**
toluene	758.2	28	18.9127	18.7241	1	18.9127	18.7241	0.1560	0.1544	**0.1552**
2,3-dimethylhexane	761.8	29	0.1431	0.1502	1	0.1431	0.1502	0.0012	0.0012	**0.0012**
3-ethyl-2-methylpentane	763.6	30	0.0333	0.0330	1	0.0333	0.0330	0.0003	0.0003	**0.0003**
2-methylheptane	766.8	31	0.3996	0.4118	1	0.3996	0.4118	0.0033	0.0034	**0.0033**
4-methylheptane	768.4	32	0.1900	0.1944	1	0.1900	0.1944	0.0016	0.0016	**0.0016**
3,4-dimethylhexane	771.1	33	0.0603	0.0625	1	0.0603	0.0625	0.0005	0.0005	**0.0005**
3-methylheptane	774.5	34	0.3878	0.3994	1	0.3878	0.3994	0.0032	0.0033	**0.0032**
3-ethylhexane	775.8	35	0.0984	0.0990	1	0.0984	0.0990	0.0008	0.0008	**0.0008**
cis-1,3-dimethylcyclohexane	779.4	36	0.0348	0.0361	1	0.0348	0.0361	0.0003	0.0003	**0.0003**
trans-1,4-dimethylcyclohexane	781.3	37	0.0112	0.0109	1	0.0112	0.0109	0.0001	0.0001	**0.0001**

Table B14. Sample #14 (High solids water gloss) (Continued).

Solids, %	25.74	25.75	25.75							
			Area %			Adjusted Area		Fraction		**Average**
	Ret Index	Pk#	Run 1	Run 2	Res Fact	Run 1	Run 2	Run 1	Run 2	**Fraction**
butyl acetate	798.2	38	4.4108	4.4821	0.61	7.2057	7.3222	0.0594	0.0604	**0.0599**
octane	800.0	39	0.0896	0.0894	1	0.0896	0.0894	0.0007	0.0007	**0.0007**
ethylcyclohexane	836.0	40	0.0119	0.0091	1	0.0119	0.0091	0.0001	0.0001	**0.0001**
ethylbenzene	854.0	41	4.9264	4.9276	1	4.9264	4.9276	0.0406	0.0406	**0.0406**
trans, trans-1,2,4-trimethylcyclohexane	857.0	42	0.0116	0.0126	1	0.0116	0.0126	0.0001	0.0001	**0.0001**
1,3-dimethylbenzene	863.3	43	14.4709	14.3935	1	14.4709	14.3935	0.1194	0.1187	**0.1190**
1,4-dimethylbenzene	864.2	44	4.0591	4.0572	1	4.0591	4.0572	0.0335	0.0335	**0.0335**
3-methyloctane	874.2	45	0.0285	0.0341	1	0.0285	0.0341	0.0002	0.0003	**0.0003**
1,2-dimethylbenzene	885.9	46	5.7375	5.7562	1	5.7375	5.7562	0.0473	0.0475	**0.0474**
trans-1-methyl-3-ethylcyclohexane	891.0	47	0.0346	0.0321	1	0.0346	0.0321	0.0003	0.0003	**0.0003**
nonane	900.0	48	0.0691	0.0740	1	0.0691	0.0740	0.0006	0.0006	**0.0006**
cis-1-methyl-4-ethylcyclohexane	917.9	49	0.0764	0.0854	1	0.0764	0.0854	0.0006	0.0007	**0.0007**
cis-1-methyl-2-ethylcyclohexane	937.4	50	0.0079	0.0140	1	0.0079	0.0140	0.0001	0.0001	**0.0001**
propylbenzene	948.5	51	0.0296	0.0314	1	0.0296	0.0314	0.0002	0.0003	**0.0003**
1-ethyl-3-methylbenzene	955.5	52	0.0529	0.0549	1	0.0529	0.0549	0.0004	0.0005	**0.0004**
1-ethyl-4-methylbenzene	958.0	53	0.0203	0.0212	1	0.0203	0.0212	0.0002	0.0002	**0.0002**
1,3,5-trimethylbenzene	963.2	54	0.0249	0.0220	1	0.0249	0.0220	0.0002	0.0002	**0.0002**
4-methylnonane	966.6	55	0.0118	0.0072	1	0.0118	0.0072	0.0001	0.0001	**0.0001**
1,2,4-trimethylbenzene	989.1	56	0.0154	0.0174	1	0.0154	0.0174	0.0001	0.0001	**0.0001**
decane	1000.0	57	0.0350	0.0404	1	0.0350	0.0404	0.0003	0.0003	**0.0003**
undecane	1100.0	58	0.0096	0.0079	1	0.0096	0.0079	0.0001	0.0001	**0.0001**
Speciated Total			100	100		121.2132	121.2629	1.0000	1.0000	**1.0000**

Table B15. Sample #15 (Semi-gloss lacquer, clear bar-top).

Solids, %	24.64	24.56								
			Area %			Adjusted Area		Fraction		Average
	Ret Index	Pk#	Run 1	Run 2	Res Fact	Run 1	Run 2	Run 1	Run 2	Fraction
methanol	400.0	1	0.0105	0.0105	0.35	0.0301	0.0301	0.0002	0.0002	**0.0002**
acetone	472.7	2	0.1902	0.1910	0.525	0.3622	0.3639	0.0024	0.0024	**0.0024**
isopropyl alcohol	490.7	3	5.5600	5.6005	0.54	10.3526	10.4280	0.0692	0.0697	**0.0695**
2-butanone	575.4	4	40.4092	40.5614	0.63	64.1416	64.3832	0.4288	0.4306	**0.4297**
3-methylpentane	588.1	5	0.0680	0.0691	1	0.0680	0.0691	0.0005	0.0005	**0.0005**
isobutyl alcohol	615.1	6	1.9492	1.9101	0.68	2.8665	2.8089	0.0192	0.0188	**0.0190**
2,4-dimethylpentane	648.0	7	0.0093	0.0085	1	0.0093	0.0085	0.0001	0.0001	**0.0001**
butyl alcohol	649.0	8	0.1060	0.1075	0.7	0.1514	0.1535	0.0010	0.0010	**0.0010**
OTHER	657.4	9	0.0176	0.0179	1	0.0176	0.0179	0.0001	0.0001	**0.0001**
2-methylhexane	664.5	10	0.0119	0.0117	1	0.0119	0.0117	0.0001	0.0001	**0.0001**
2,3-dimethylpentane	666.9	11	0.0182	0.0177	1	0.0182	0.0177	0.0001	0.0001	**0.0001**
3-methylhexane	673.9	12	0.0210	0.0072	1	0.0210	0.0072	0.0001	0.0000	**0.0001**
1,3-dimethylcyclopentane	682.2	13	0.0271	0.0206	1	0.0271	0.0206	0.0002	0.0001	**0.0002**
cis-1,3-dimethylcyclopentane	685.3	14	0.0302	0.0305	1	0.0302	0.0305	0.0002	0.0002	**0.0002**
1,2-dimethylcyclopentane	688.3	15	0.0439	0.0443	1	0.0439	0.0443	0.0003	0.0003	**0.0003**
heptane	700.0	16	0.0502	0.0505	1	0.0502	0.0505	0.0003	0.0003	**0.0003**
1,2-dimethylcyclopentane	721.5	17	0.0147	0.0153	1	0.0147	0.0153	0.0001	0.0001	**0.0001**
methylcyclohexane	723.3	18	0.3360	0.3329	1	0.3360	0.3329	0.0022	0.0022	**0.0022**
1,1,3-trimethylcyclopentane	725.1	19	0.0476	0.0479	1	0.0476	0.0479	0.0003	0.0003	**0.0003**
ethylcyclopentane	732.4	20	0.0162	0.0163	1	0.0162	0.0163	0.0001	0.0001	**0.0001**
2,5-dimethylhexane	733.7	21	0.0319	0.0638	1	0.0319	0.0638	0.0002	0.0004	**0.0003**

Table B15. Sample #15 (Semi-gloss lacquer, clear bar-top) (Continued).

Solids, %	24.64	24.56								
			Area %			Adjusted Area		Fraction		Average
	Ret Index	Pk#	Run 1	Run 2	Res Fact	Run 1	Run 2	Run 1	Run 2	Fraction
2,4-dimethylhexane	734.7	22	0.0324	0.1790	1	0.0324	0.1790	0.0002	0.0012	**0.0007**
1,2,4-trimethylcyclopentane	741.9	23	0.1790	0.3061	1	0.1790	0.3061	0.0012	0.0020	**0.0016**
1,2,3-trimethylcyclopentane	749.2	24	0.3066	0.0276	1	0.3066	0.0276	0.0020	0.0002	**0.0011**
toluene	757.1	25	6.1612	6.0784	1	6.1612	6.0784	0.0412	0.0406	**0.0409**
isobutylacetate	760.2	26	3.9318	3.8745	0.61	6.4231	6.3296	0.0429	0.0423	**0.0426**
2,3-dimethylhexane	761.6	27	0.0743	0.0676	1	0.0743	0.0676	0.0005	0.0005	**0.0005**
3-ethyl-2-methylpentane	763.4	28	0.0431	0.0439	1	0.0431	0.0439	0.0003	0.0003	**0.0003**
2-methylheptane	766.5	29	0.7004	0.7018	1	0.7004	0.7018	0.0047	0.0047	**0.0047**
4-methylheptane	768.1	30	0.1615	0.1627	1	0.1615	0.1627	0.0011	0.0011	**0.0011**
3,4-dimethylhexane	770.9	31	0.0508	0.0527	1	0.0508	0.0527	0.0003	0.0004	**0.0003**
3-methylheptane	774.2	32	0.3656	0.3690	1	0.3656	0.3690	0.0024	0.0025	**0.0025**
3-ethylhexane	775.5	33	0.1347	0.1380	1	0.1347	0.1380	0.0009	0.0009	**0.0009**
3,3-dimethylhexane	777.8	34	0.0671	0.0672	1	0.0671	0.0672	0.0004	0.0004	**0.0004**
cis-1,3-dimethylcyclohexane	779.1	35	0.9702	0.9691	1	0.9702	0.9691	0.0065	0.0065	**0.0065**
trans-1,4-dimethylcyclohexane	781.0	36	0.3932	0.3894	1	0.3932	0.3894	0.0026	0.0026	**0.0026**
1,1-dimethylcyclohexane	787.2	37	0.1397	0.1401	1	0.1397	0.1401	0.0009	0.0009	**0.0009**
cis-1-ethyl-3-methylcyclopentane	788.9	38	0.1594	0.1608	1	0.1594	0.1608	0.0011	0.0011	**0.0011**
trans-1-ethyl-3-methylcyclopentane	791.0	39	0.1471	0.1464	1	0.1471	0.1464	0.0010	0.0010	**0.0010**
cis-1-ethyl-2-methylcyclopentane	792.4	40	0.3339	0.3368	1	0.3339	0.3368	0.0022	0.0023	**0.0022**
butyl acetate	799.1	41	25.3236	25.1446	0.61	41.3695	41.0772	0.2766	0.2747	**0.2756**

Table B15. Sample #15 (Semi-gloss lacquer, clear bar-top) (Continued).

Solids, %	24.64	24.56								
			Area %			Adjusted Area		Fraction		**Average**
	Ret Index	Pk#	Run 1	Run 2	Res Fact	Run 1	Run 2	Run 1	Run 2	**Fraction**
octane	800.0	42	0.9491	0.9479	1	0.9491	0.9479	0.0063	0.0063	**0.0063**
OTHER C9	803.7	43	0.2888	0.2864	1	0.2888	0.2864	0.0019	0.0019	**0.0019**
cis-1,4-dimethylcyclohexane	806.1	44	0.3387	0.3468	1	0.3387	0.3468	0.0023	0.0023	**0.0023**
1-ethyl-1-methylcyclopentane	813.3	45	0.1104	0.1113	1	0.1104	0.1113	0.0007	0.0007	**0.0007**
OTHER C9	818.1	46	0.0226	0.0352	1	0.0226	0.0352	0.0002	0.0002	**0.0002**
2,2,5-trimethylhexane	819.4	47	0.0504	0.0509	1	0.0504	0.0509	0.0003	0.0003	**0.0003**
2,2-dimethylheptane	820.8	48	0.0358	0.0357	1	0.0358	0.0357	0.0002	0.0002	**0.0002**
2,4-dimethylheptane	824.9	49	0.1458	0.1455	1	0.1458	0.1455	0.0010	0.0010	**0.0010**
cis-1,2-dimethylcyclohexane	829.7	50	0.2532	0.3487	1	0.2532	0.3487	0.0017	0.0023	**0.0020**
OTHER C9	831.2	51	0.2569	0.3228	1	0.2569	0.3228	0.0017	0.0022	**0.0019**
OTHER C9	833.5	52	0.1248	0.1260	1	0.1248	0.1260	0.0008	0.0008	**0.0008**
propylcyclopentane	834.8	53	0.1145	0.1102	1	0.1145	0.1102	0.0008	0.0007	**0.0008**
ethylcyclohexane	835.8	54	0.6316	0.6453	1	0.6316	0.6453	0.0042	0.0043	**0.0043**
2,5-dimethylheptane	838.2	55	0.2091	0.2193	1	0.2091	0.2193	0.0014	0.0015	**0.0014**
1,1,3-trimethylcyclohexane	841.4	56	0.8398	0.8415	1	0.8398	0.8415	0.0056	0.0056	**0.0056**
OTHER C9	844.3	57	0.1392	0.1437	1	0.1392	0.1437	0.0009	0.0010	**0.0009**
1,1,4-trimethylcyclohexane	845.7	58	0.0610	0.0534	1	0.0610	0.0534	0.0004	0.0004	**0.0004**
2,6-dimethylheptane	847.2	59	0.1029	0.1033	1	0.1029	0.1033	0.0007	0.0007	**0.0007**
OTHER C9	852.0	60	0.0846	0.0189	1	0.0846	0.0189	0.0006	0.0001	**0.0003**
ethylbenzene	853.2	61	0.5576	0.6186	1	0.5576	0.6186	0.0037	0.0041	**0.0039**
trans, trans-1,2,4-trimethylcyclohexane	856.7	62	0.3909	0.3923	1	0.3909	0.3923	0.0026	0.0026	**0.0026**
2,3-dimethylheptane	859.5	63	0.2560	0.2029	1	0.2560	0.2029	0.0017	0.0014	**0.0015**
1,3-dimethylbenzene	861.7	64	0.9484	0.9274	1	0.9484	0.9274	0.0063	0.0062	**0.0063**
1,4-dimethylbenzene	862.8	65	0.3825	0.3820	1	0.3825	0.3820	0.0026	0.0026	**0.0026**

Table B15. Sample #15 (Semi-gloss lacquer, clear bar-top) (Continued).

Solids, %	24.64	24.56								
			Area %			Adjusted Area		Fraction		**Average**
	Ret Index	Pk#	Run 1	Run 2	Res Fact	Run 1	Run 2	Run 1	Run 2	**Fraction**
4-methyloctane	866.0	66	0.2137	0.2237	1	0.2137	0.2237	0.0014	0.0015	**0.0015**
2-methyloctane	868.5	67	0.0297	0.0314	1	0.0297	0.0314	0.0002	0.0002	**0.0002**
3-ethylheptane	871.6	68	0.2260	0.2385	1	0.2260	0.2385	0.0015	0.0016	**0.0016**
3-methyloctane	873.8	69	0.1587	0.1470	1	0.1587	0.1470	0.0011	0.0010	**0.0010**
trans, cis-1,2,4-trimethylcyclohexane	876.0	70	0.0786	0.0866	1	0.0786	0.0866	0.0005	0.0006	**0.0006**
OTHER C9	878.5	71	0.0157	0.0156	1	0.0157	0.0156	0.0001	0.0001	**0.0001**
trans, cis-1,2,4-trimethylcyclohexane	880.4	72	0.1165	0.1193	1	0.1165	0.1193	0.0008	0.0008	**0.0008**
1,2,3-trimethylcyclohexane	881.0	73	0.0996	0.0995	1	0.0996	0.0995	0.0007	0.0007	**0.0007**
1,2-dimethylbenzene	885.0	74	0.5082	0.5026	1	0.5082	0.5026	0.0034	0.0034	**0.0034**
cis, trans-1,2,4-trimethylcyclohexane	887.3	75	0.0838	0.0856	1	0.0838	0.0856	0.0006	0.0006	**0.0006**
1,2,3-trimethylcyclohexane	888.7	76	0.0708	0.0708	1	0.0708	0.0708	0.0005	0.0005	**0.0005**
2-butoxyethanol	891.5	77	1.8712	1.8558	0.58	3.2443	3.2177	0.0217	0.0215	**0.0216**
trans-1-methyl-3-ethylcyclohexane	893.9	78	0.0783	0.0784	1	0.0783	0.0784	0.0005	0.0005	**0.0005**
nonane	900.0	79	0.1356	0.1599	1	0.1356	0.1599	0.0009	0.0011	**0.0010**
1,2,3-trimethylcyclohexane	908.9	80	0.0261	0.0253	1	0.0261	0.0253	0.0002	0.0002	**0.0002**
2,4-dimethyloctane	911.7	81	0.0699	0.0685	1	0.0699	0.0685	0.0005	0.0005	**0.0005**
isopropylbenzene	917.8	82	0.0182	0.0153	1	0.0182	0.0153	0.0001	0.0001	**0.0001**
isopropylcyclohexane	925.1	83	0.0594	0.0750	1	0.0594	0.0750	0.0004	0.0005	**0.0004**
propylcyclohexane	935.2	84	0.0266	0.0444	1	0.0266	0.0444	0.0002	0.0003	**0.0002**
2,6-dimethyloctane	937.3	85	0.0196	0.0149	1	0.0196	0.0149	0.0001	0.0001	**0.0001**
1-ethyl-3-methylbenzene	955.5	86	0.0292	0.0319	1	0.0292	0.0319	0.0002	0.0002	**0.0002**
1-ethyl-4-methylbenzene	958.0	87	0.0147	0.0176	1	0.0147	0.0176	0.0001	0.0001	**0.0001**
4-methylnonane	966.5	88	0.0174	0.0213	1	0.0174	0.0213	0.0001	0.0001	**0.0001**
1,2,4-trimethylbenzene	989.0	89	0.0384	0.0102	1	0.0384	0.0102	0.0003	0.0001	**0.0002**
trans-1-methyl-3-propylcyclohexane	995.4	90	0.0132	0.0081	1	0.0132	0.0081	0.0001	0.0001	**0.0001**
decane	1000.0	91	0.0420	0.0456	1	0.0420	0.0456	0.0003	0.0003	**0.0003**
Speciated Total			100	100		149.590	149.5362	1.0000	1.0000	**1.0000**

Appendix C
Cover Letter, Mailing 1

UNIVERSITY OF CALIFORNIA, DAVIS

BERKELEY · DAVIS · IRVINE · LOS ANGELES · RIVERSIDE · SAN DIEGO · SAN FRANCISCO — SANTA BARBARA · SANTA CRUZ

Robert Anex
Researcher

DEPARTMENT OF CIVIL AND
ENVIRONMENTAL ENGINEERING
UNIVERSITY OF CALIFORNIA
DAVIS, CALIFORNIA 95616
(916) 752--2605, -0586
FAX (916) 752-7872
E-Mail anex@mrbill.engr.ucdavis.edu

July 27, 1994

Dear Respondent:

In order to do a more effective job of cleaning California's air, the Air Resources Board must periodically update its inventory of emissions. Most of this effort is directed toward measuring emissions from cars, trucks and other mobile sources. However, stationary-source emissions must also be updated from time to time.

As part this effort, pursuant to Section 91100, Title 17 of the California Administrative Code, the California Air Board (ARB) is responsible for the collection of air pollution related information from owners and operators of air pollution emission sources. The ARB has contracted with the Department of Civil and Environmental Engineering, University of California, Davis, as its representative to conduct a survey to determine the amount of emissions from the industrial coating of wood furniture and fixtures for each county in the state. Although some of the information requested in the enclosed survey is collected by local air quality management districts, the data are not collected or stored in a manner that allows them to be useful in this effort. Other information requested in this survey has not been collected before and will aid evaluating the costs and benefits of rules affecting wood furniture manufacturers. I am requesting your assistance in completing the enclosed survey and returning it to the University.

In order to estimate emissions of total organic gases from the industrial coating of wood furniture and fixtures, several hundred firms, including yours, have been selected at random to participate in this survey. The survey results from your firm will be combined with the information received from the other facilities to support updating of emissions estimates for the state. Only summaries of data on emissions from industrial coating of wood furniture and fixtures will be published. Specifics regarding your facility will not be published.

On each of the survey forms you have the option of designating certain information as trade secret. Trade secrets will be maintained as confidential.

Please return the completed forms, in the enclosed postage paid envelope, by August 15, 1995. Questions regarding this survey may be addressed to Mr. Robert Anex at (916) 752-2605.

If you would like to know more about ARB data-gathering needs for this inventory, or have any questions regarding ARB policy, please contact John R. Holmes, Chief, Research Division at (916) 445-0753.

Sincerely Yours,

Robert P. Anex, Ph.D.
Department of Civil and Environmental Engineering
University of California, Davis

enclosures

Appendix D
Non-Disclosure Agreement, Mailing 1

NONDISCLOSURE AGREEMENT

Whereas, the University of California, Davis (UCD) is under contract No. 93-343 (the Contract) with the California Air Resources Board (ARB) to develop a Total Organic Gas emissions inventory for wood furniture and fixtures.

Whereas, in order to fully perform the Contract, it will be necessary for UCD to have access to data in the possession of ARB, the air pollution control and air quality management districts (the districts), and surveyed businesses which pertains to the emissions of solvents (including emission factors, process rates, and volatile organic compound contents), and which has been designated confidential by the businesses which have furnished the data (the Confidential Data).

Now, therefore, in consideration of the granting to UCD of the Contract, UCD represents as follows:

1. UCD shall preserve in strict confidence all Confidential Data supplied to UCD by the ARB, the districts, and businesses during the performance of the Contract, and shall not use any Confidential Data in such a manner as to disclose it to any person or entity except as specifically authorized in writing by a duly authorized representative of the ARB.

2. The Confidential Data shall only be supplied to UCD employees or subcontractors working under the direct supervision of UCD, and UCD shall obtain from each employee or subcontractor who shall have access to the Confidential Data a Nondisclosure Agreement.

3. UCD shall deliver to the ARB all Confidential Data it or its subcontractors have received from the ARB, the districts and businesses when the Confidential Data are no longer required by the Contract, or upon completion of the Contract, whichever comes first.

University of California, Davis

By:

Dr. Robert P. Anex
Researcher
10 October 1995

Appendix E
Survey Form, Mailing 1

Survey of Paint and Coating Usage in the Manufacture of Wood Furniture and Fixtures

Company Name	
Street address	County
City State	Zip code
Air Quality Management District in which your company is located	
Name of person completing survey	Phone number
Position or title of person completing survey	Date completed

(All questions apply only to facilities located in the county listed above.)

1. What type of wood products does your firm manufacture? Please check all applicable categories:
   - ☐ wood kitchen cabinets
   - ☐ custom wood cabinets
   - ☐ wood household furniture
   - ☐ upholstered household furniture
   - ☐ wood TV and radio cabinets
   - ☐ wood office furniture
   - ☐ wood partitions and fixtures
   - ☐ wood furniture or fixtures - none of the above

Wood Coating Usage

2. Please estimate your total annual usage for the period June 1, 1994 to May 31, 1995 of products in the following coating categories (used in the manufacture of wood furniture and fixtures only). If your local air district requires you to maintain records of coating use, you may attach copies of those records or their summary to answer this question. (Use additional sheets as required)

	Product Name	Annual Usage	Units (gal)	VOC Content	Units (g/L)
clear topcoats					
washcoats					
fillers					
opaque stains					
semi-transparent stains					
enamels					
colored coatings					

sanding sealers					
other sealers					
other coatings					
other compounds					

3. Do you add solvent or other additives to the wood coatings you use (e.g., to control drying time)? ☐ Yes ☐ No

   If your firm uses coating additives such as solvent, please fill in the following table (use additional sheets as necessary):

Additive Use

Additive Product Name	VOC content	Units (e.g. g/L)	Annual product usage	Units (e.g. gal)

4. Do you use solvents in clean-up of wood coating equipment?
☐ Yes ☐ No

5. Do you clean application equipment by dipping/rinsing or by running solvent through the application equipment?
☐ dipping/rinsing ☐ run through ☐ other

6. If you use solvent in equipment clean-up, please provide the following information on <u>annua</u> solvent usage:

Solvent type or product name	VOC Content	units g/L	volume purchased	units gals	volume disposed	units gals	volume recycled	units gals

7. Do you manufacture or formulate any of the wood coatings you use?
☐ Yes ☐ No

If so, what are the ingredients used?

How much wood coatings do you manufacture or formulate and use annually?

_______ gallons/yr

<u>The following questions apply to coating usage over the next five years.</u>

8. Do you anticipate a change in the amount of "low-VOC" coatings your company uses? ☐ Yes ☐ No

   If so, will your firm use "low-VOC" coatings:

   ☐ exclusively?

   ☐ mostly?

   ☐ more?

   ☐ less?

9. Is the anticipated change motivated by:

   ☐ cost considerations?

   ☐ safety considerations?

   ☐ existing or anticipated air pollution regulation?

   ☐ existing or anticipated hazardous waste regulation?

10. In what other ways do you see your use of wood furniture and fixture coatings changing in the next five years?

11. Are these changes motivated by:

   ☐ business growth? If so, _______ % annual growth anticipated.

   ☐ cost/performance considerations?

   ☐ existing regulation?

   ☐ anticipated regulation?

Coating Application

12. Does your facility have peak production seasons (e.g., pre-Christmas bulge)?

☐ No seasonal changes in production

If so, please provide the following information:

Season	Beginning Date (e.g., early Oct.)	Ending Date (e.g., mid Dec.)	Proportion of production (e.g., 25%)
1			
2			
3			
4			

13. During what hours are coatings applied (e.g., between 7:00 a.m. and 5:00 p.m.)?

14. Is wood coatings usage higher during certain times of day (e.g., cool mornings in the summer to control drying time)?

☐ No variation in use with time of day

If coating use varies with time of day, please provide the following information (where "season" corresponds to those defined in question number 12 above):

Season	Peak use period (e.g., 6 - 9 a.m.)	% of daily use (e.g., 25%)	Low or non-use period (e.g., noon - 1:00)	% of daily use (e.g., 25%)
1				
2				
3				
4				

15. What type of filters or emission controls do you have on your drying room or facility to contrc air emissions (if any)? ☐ None

16. What type of filters of emission control devices are you considering or planning? ☐ None

17. Do you currently recycle any used or waste wood coatings?
☐ Yes ☐ No
If so, please describe how the recycling is done.

Air Emission Regulations

18. How do furniture coating usage or emission regulations affect your business at this time?
    - [ ] Not significantly

19. Is complying with emission regulations a substantial cost to your business?
    - [ ] Yes [ ] No If so, how?

20. Is disposal of coating related waste (e.g., rags and waste coatings) a substantial cost to your business? [ ] Yes [ ] No

21. Do you anticipate new, more restrictive emission regulations in the next few years? [ ] Yes [ ] No

    If so, how do you expect them to affect your business?

22. What is your principal source of information about air pollution regulations?
    - [ ] Local air quality control district
    - [ ] California Air Resources Board
    - [ ] Trade organization publications or meetings
    - [ ] California Air Resources Board
    - [ ] Other, please describe ______________________________

General Company Information

23. What is the average number of production workers you employ in the manufacture of wood furniture and fixtures?

________ workers

24. What is the average annual person-years of production labor used in the manufacture of wood furniture and fixtures (total for your facility)?

________ person-years

25. What is your annual expenditure on coatings (i.e., stains, fillers, sealers, topcoats)?

________ dollars/year

26. What is your annual total cost of materials in the manufacture of wood furniture and fixtures (e.g. coatings, wood, fasteners, etc.)?

________ dollars/year

27. What is your annual total value of shipments of wood furniture and fixtures?

________ dollars/year

28. Please share with us any general comments or issues that you feel are important in the purchase, application or regulation of wood furniture and fixture coatings:

Appendix F
Cover Letter, Mailing 2

Cal/EPA

California Environmental Protection Agency

Air Resources Board

John D. Dunlap, III
Chairman

P.O. Box 2815
2020 L Street
Sacramento, CA
95812-2815
(916) 322-5840
(916) 327-5748 FAX

Pete Wilson
Governor

James M. Strock
Secretary for Environmental Protection

May 24, 1996

Dear Respondent:

I am writing to you to encourage you to respond to the enclosed survey of industrial coating of wood furniture and fixtures. A similar survey was sent out during 1995, but because of a very low response rate, the survey is being remailed. The only firms receiving this new survey request are those that did not participate in the original survey. Your response is important for accurately representing the industry.

In order to do a more effective job of cleaning California's air, the Air Resources Board (ARB) must periodically update its inventory of emissions. Most of this effort is directed toward measuring emissions from cars, trucks, and other mobile sources. However, stationary-source emissions must also be updated from time to time.

As part of this effort, pursuant to Section 91100, Title 17 of the California Administrative Code, the ARB is responsible for the collection of air pollution related information from owners and operators of sources of air pollution emissions. The ARB has contracted with the Department of Civil and Environmental Engineering at the University of California, Davis, as its representative to conduct a survey to determine the amount of emissions from the industrial coating of wood furniture and fixtures for each county in the state. I am requesting your assistance in completing the enclosed survey and returning it to the University.

In order to estimate emissions of total organic gases from the industrial coating of wood furniture and fixtures, several hundred firms, including yours, have been selected at random to participate in this survey.. Although some of the requested data are similar to information you already submit to local districts, that information is not available to us in the level of detail necessary to accomplish our legislated goal.

The survey results from your firm will be combined with the information received from other facilities to support updating our statewide emissions estimates. Only *summaries* of data on emissions from industrial coating of wood furniture and fixtures will be published. Specifics regarding your facility will not be published.

On each of the survey forms you have the option of designating certain information as trade secret (see attached Nondisclosure Agreement). Trade secrets will be maintained as confidential. However, in accordance with Sections 91010 and 91011 of Title 17, and Section 6254.7 of the Government Code, emissions data cannot be classified as trade secret.

Please return the completed form by June 15, 1996 to:

Dr. Robert Anex
Department of Civil and Environmental Engineering
University of California
Davis, CA 95616

If you have any questions about the survey, or its use, please contact Dr. Robert Anex at (916) 752-2605.

If you would like to know more about our data-gathering needs for this inventory, or have any questions regarding ARB policy, please contact me at (916) 445-0753.

Sincerely Yours,

Robert D. Barham

Robert D. Barham
Assistant Chief
Research Division

Enclosures: Nondisclosure Agreement; survey form.

Appendix G
Non-Disclosure Agreement, Mailing 2

NONDISCLOSURE AGREEMENT

Whereas, the University of California, Davis (UCD) is under contract No. 93-343 (the Contract) with the California Air Resources Board (ARB) to develop a Total Organic Gas emissions inventory for wood furniture and fixtures.

Whereas, in order to fully perform the Contract, it will be necessary for UCD to have access to data in the possession of the ARB, the air pollution control and air quality management districts (the districts), and surveyed businesses with pertains to the emissions of solvents (including emission factors and process rates), and which has been designated confidential by the businesses which have furnished the data (the Confidential Data);

Now, therefore, in consideration of the granting to UCD of the Contract, UCD agrees to represents as follows:

1. UCD shall preserve in strict confidence all Confidential Data supplied to UCD by the ARB, the districts, and businesses during the performance of the Contract, and shall not use and Confidential Data in such a manner as to disclose it to any person or entity except as specifically authorized in writing by a duly authorized representative of the ARB.

2. The Confidential Data shall only be supplied to UCD employees or subcontractors working under the direct supervision of UCD, and UCD shall obtain from each employee or subcontractor who shall have access to the Confidential Data a Nondisclosure Agreement.

3. UCD shall return to the ARB all Confidential Data it or its subcontractors have received from the ARB, the districts and businesses when the Confidential Data are no longer required by UCD for performance of the work required by the Contract, or upon completion of the Contract, whichever first occurs.

University of California, Davis

By: Jay R. Lund
Jay R. Lund

Title: Principal Investigator

Date: 28 May 1996

Appendix H
Survey Form, Mailing 2

Survey of Paint and Coating Usage in the Manufacture of Wood Furniture and Fixtures

Company Name	
Street address	County
City State	Zip code
Air Quality Management District in which your company is located	
Name of person completing survey	Phone number
Position or title of person completing survey	Date completed

(All questions apply only to facilities located in the county listed above.)

1. What type of wood products does your firm manufacture? Please check all applicable categories:
   - ☐ wood kitchen cabinets
   - ☐ custom wood cabinets
   - ☐ wood household furniture
   - ☐ upholstered household furniture
   - ☐ wood TV and radio cabinets
   - ☐ wood office furniture
   - ☐ wood partitions and fixtures
   - ☐ wood furniture or fixtures - none of the above

Wood Coating Usage

2. Please estimate your total annual usage for the period June 1, 1994 to May 31, 1995 of products in the following coating categories (used in the manufacture of wood furniture and fixtures only). If your local air district requires you to maintain records of coating use, you may attach copies of those records or their summary to answer this question. (Use additional sheets as required)

	Product Name	Annual Usage	Units (gal)	V O C Content	Units (g/L)
clear topcoats					
washcoats					
fillers					
opaque stains					
semi-transparent stains					
enamels					
colored coatings					

sanding sealers					
other sealers					
other coatings					
other compounds					

3. Do you add solvent or other additives to the wood coatings you use (e.g., to control drying time)? ☐ Yes ☐ No

If your firm uses coating additives such as solvent, please fill in the following table (use additional sheet: as necessary):

Additive Use

Additive Product Name	VOC content	Units (e.g. g/L)	Annual product usage	Units (e.g. gal)

4. Do you use solvents in clean-up of wood coating equipment?
   ☐ Yes ☐ No

5. Do you clean application equipment by dipping/rinsing or by running solvent through the application equipment?

   ☐ dipping/rinsing ☐ run through ☐ other

6. If you use solvent in equipment clean-up, please provide the following information on <u>annual</u> solvent usage:

Solvent type or product name	VOC Content	units g/L	volume purchased	units gals	volume disposed	units gals	volume recycled	units gals

<u>Coating Application</u>

7. Does your facility have peak production seasons (e.g., pre-Christmas bulge)?

   ☐ No seasonal changes in production

If so, please provide the following information:

Season	Beginning Date (e.g., early Oct.)	Ending Date (e.g., mid Dec.)	Proportion of production (e.g., 25%)
1			
2			
3			
4			

8. During what hours are coatings applied (e.g., between 7:00 a.m. and 5:00 p.m.)?

9. Is wood coatings usage higher during certain times of day (e.g., cool mornings in the summer to control drying time)?

☐ No variation in use with time of day

If coating use varies with time of day, please provide the following information (where "season" corresponds to those defined in question number 7 above):

Season	Peak use period (e.g., 6 - 9 a.m.)	% of daily use (e.g., 25%)	Low or non-use period (e.g., noon - 1:00)	% of daily use (e.g., 25%)
1				
2				
3				
4				

10. What type of filters or emission controls do you have on your drying room or facility to control air emissions (if any)? ☐ None

11. What type of filters of emission control devices are you considering or planning? ☐ None

General Company Information

12. What is the average number of production workers you employ in the manufacture of wood furniture and fixtures?

________ workers

13. What is the average annual person-years of production labor used in the manufacture of wood furniture and fixtures (total for your facility)?

________ person-years

14. What is your annual expenditure on coatings (i.e., stains, fillers, sealers, topcoats)?

________ dollars/year

15. What is your annual total cost of materials in the manufacture of wood furniture and fixtures (e.g. coatings, wood, fasteners, etc.)?

________ dollars/year

16. What is your annual total value of shipments of wood furniture and fixtures?

________ dollars/year